

PM USA
R&D STRATEGIC PLAN
1991-1995

CONFIDENTIAL

2026236097

1991-1995

R&D STRATEGIC PLAN

2026230099

1991-1995

PHILIP MORRIS USA R&D

STRATEGIC PLAN

2026230100

PLAN OUTLINE/CONTENT

	Page
EXECUTIVE SUMMARY	
A. PM USA MISSION STATEMENT/GOALS	1
B. R&D RESPONSIBILITIES	3
C. STATUS REVIEW	4
Government Regulations/Domestic	
Government Regulations/Export	
Blend Consolidation/Export	
Support of Established Product Lines	
Environmental Regulations	
Modernization and Technology	
Technology Driven Products	
Potential Future Technology-Driven Products	
Summary	
D. INTERNAL ANALYSIS	10
R&D Programs	
R&D Resources	
PM Europe R&D	
Technology Review	
R&D Patents and Publications	
Technical Synergy	
Internal Analysis Summary	
E. EXTERNAL ANALYSIS	19
Industry Highlights	
Competitive Analysis	
Emerging Competitor Technology	
Supplier Analysis	
Social and Political Influences	
External Analysis Summary	

2026230101

F. ANALYSIS OF FUTURE FACTORS

47

The Marketplace

- Competitive Pressure-Domestic
- Competitive Pressure-Foreign
- Segmented Market Trends
- Projected Sales Volume
- Demographics
- New Market Focuses

Social and Political Factors

- Perceived Health Concerns
- Social Acceptability
- Social Trends
- Strategies of Anti-Smoking Groups
- Legislative Activity
- Regulation of Ingredients
- Regulation of Smoke Content
- Ignition Propensity
- Environmental Issues
- Pack Tampering

Technological Factors

- Externally Developing Technologies
- Strategic Technologies

Internal Environment

- Technology Management
- R&D Resources
- Capacity
- Manufacturing Support
- Raw Material Supply
- Product Quality
- Cost Efficiency

2026230102

	Page
Obsolescence of the Current Product	
Obsolescence of Current Processes	
Dependence of R&D on Suppliers	
Summary of Future Factors	
G. R&D ISSUES	87
H. R&D STRATEGIS GOALS	91
I. IMPLEMENTATION	97

Appendices

Appendix A	Beta Plan
Appendix B	PM Europe R&D Plan
Appendix C	Technology Review
Appendix D	Externally Developing Technologies
Appendix E	Strategic Technologies
Appendix F	PM USA R&D Patents and Publications
Appendix G	RJR R&D Organizational Chart
Appendix H	B&W R&D Organizational Chart
Appendix I	JTI Annual Report and Brochures
Appendix J	Segmented Cigarette Market Trends
Appendix K	Response and Impact of Anti-Tobacco Legislation in Canada
Appendix L	EHS Five-Year Environmental Plan
Appendix M	Patents Related to Obsolescence of the Current Product
Appendix N	Resource Allocations by Program
Appendix O	Resource Allocations by Division
Appendix P	Action Plan/Recommendations
Appendix Q	Objective and Strategies of Major Programs

2026230103

Executive Summary

2026230104

EXECUTIVE SUMMARY

2026230105

EXECUTIVE SUMMARY

The 1990 PM USA R&D Five Year Strategic Plan is based on an internal analysis, including current R&D programs and resources; an external analysis, including competitors, suppliers, and available technology; and an analysis of future factors which are anticipated to impact our business during the plan period.

From the analysis of future factors, strategic threats and opportunities are emerging in the following areas: the **marketplace**, **social/political** issues, **technology**, and our **internal environment**. The key **marketplace factors** relate to a declining market, dynamic market, increasing export market, product changes required due to government regulations, and technology-driven products. In a declining market, volume gain can be achieved by maximizing the potential of existing brands, attracting consumers with value-added products, and increasing representation in all strategic market segments underrepresented by PM (e.g. menthol, ultra low tar, price/value). New market segments (dynamic market) add to the proliferation of products but, on the other hand, provide additional market opportunities (e.g. price/value and older smokers). Taxes on cigarettes are increasing. This, along with industry pricing policies, means our consumers are paying more for a pack of cigarettes. Thus, it is important to increase value to the consumer by maximizing the quality of our full margin brands. Maintaining subjective quality, automated inspection systems, freshness improvements, maintaining consistency and improved packaging are potential ways to increase benefit to the consumer. Maximizing the potential of our full margin brands will have a more significant impact on our profitability. The increasing export market requires additional resources to support and continue growth as well as create new market segments. Product changes due to government regulations involves reducing ignition propensity; reducing, consolidating, and managing ingredients; modifying and labeling smoke content; and modifying the product to counteract smoking restrictions (low sidestream) or environmental tobacco smoke issues (Project PACT). Technology-driven products are being developed to address consumer wants and external requirements. Some product development is shorter-term in nature (i.e. reduced sidestream/paper technology); however, other products will require much longer timeframes (i.e. Project Beta).

Many **social/political** factors will affect the business during the plan period. Perceived health concerns, social acceptability, environmental issues, and a multitude of legislative activity at all levels of government will continue to affect our industry. Key legislative activities affecting R&D involve the regulation of ingredients, smoke content, and ignition propensity. A wide variety of R&D activities will be devoted to addressing these issues. Some of these include developing ignition propensity tests and modeling studies, managing and consolidating ingredients, product development and modifications to address smoke content restrictions and

2026230106

labeling requirements, and developing products which meet consumer wants and marketplace issues.

Technologies have proliferated and will continue to proliferate. The success of future product development and commercialization efforts is dependent on our ability to maximize the utilization of available technologies that are of strategic interest to our business. Mechanisms are discussed through which externally developing technologies are identified, evaluated, and strategic technologies selected for implementation into our programs and products.

Internal environment factors relate to the needs of our company which will affect our ability to do business in the future. R&D programs have been developed to address certain operations issues relating to capacity (e.g. Cast Leaf and New Expanded Tobacco Processes), manufacturing support (materials for high speed manufacturing cost efficiency), raw material supply, quality (flavor and adhesive specifications, and materials evaluation), and dependence on suppliers. Cost efficiencies should be maximized throughout the Company. New products, new technologies and the large number of issues facing the Company in the foreseeable future all may threaten to increase the cost of doing business. R&D programs are generally conducted in a manner that maintains PM's proprietary position. While this strategy may increase initial R&D investment, and therefore R&D cost, "ownership" of important product and process technology can certainly lower the overall cost to the Company by allowing us to exercise some control over the vendor as well as allowing us to "spin off" or license such technology if it is in our interest to do so. Technology management encompasses the need to maintain a qualified staff in the face of rapidly changing technologies, the availability of skilled scientists, and the need for effective communication to facilitate technology transfer and the commercialization of new products. New technologies are developing rapidly, and technology assessment and evaluation methods need to keep pace with the change. Personnel skill needs will also change rapidly, making highly trained worker skills obsolete in a relatively short period of time. Adequate training programs will need to be instituted to maintain skill competence in rapidly changing areas. In addition, utilization of outside sources of technology will need to be maximized to obtain key technologies without having to internalize expertise in the area. Intellectual property rights will become more important as novel technology-driven products become commercialized. Technology transfer involving effective communication among Research, Development, Engineering, Marketing, and Manufacturing will be essential to the successful commercialization of these novel products. Finally, as is widely publicized, the lack of availability of trained scientists in future years is expected to become a major issue for the country and the company. In certain disciplines, competition may be fierce, and defense-related skills may be preferentially acquired by the government. Finally, novel smoking articles and new product segments may lead to the obsolescence of our current products and/or processes. Many social/political factors are driving this process.

2026230107

Based on the consideration of PM USA's five-year goals and analysis of the future factors which will impact on the attainment of those goals, R&D's strategic goals for the 1991-1995 plan period are as follows:

1. **Support** the company's present product lines and business operations.
2. **Grow** the business **short-term** with new/optimized products and processes for both domestic and international markets.
3. **Address** consumer wants and external requirements with new technology-driven products.
4. **Grow** the business **long-term** by identifying, evaluating, developing, and implementing new technologies potentially applicable to future products and business needs.

Fourteen major programs are identified which support these strategic goals. Smaller programs either support the major programs directly (i.e. Menthol and Domestic Product Development) or form seed programs which may become a major program in the future (e.g. Combustion Research and Primary Improvement). Increased efforts over the plan period projected for Environmental Issues, and Selective Separations will most likely result in the attainment of major program status. Resources essential to the implementation of the R&D Five Year Strategic Plan are listed. Execution of the proposed programs are essential in order to increase volume and market share in our current environment.

2026230108

2026230109

PLAN

A. PM USA MISSION STATEMENT/GOALS

The Philip Morris USA Mission Statement

The mission of Philip Morris USA is continued growth--in volume, market-share, and income. To succeed we must have the best brands and marketing programs, the best people, quality products, and efficient, low cost production. We must encourage an approach to business where risk-taking, innovation and quick response are combined with financial discipline. Central to this mission is the defense of our right to market our products and of the adult consumer's right to enjoy them.

To fulfill this mission, we are committed to the following goals:

- *Build volume, market-share and profitability.*
- *Preserve and enhance the competitive spirit and commitment which make us the number one tobacco company in the USA.*
- *Employ superior people and provide a challenging work place that encourages, recognizes and rewards personal initiative.*
- *Earn the trust, respect and loyalty of our consumers, customers and employees.*
- *Create strategically sound long term plans and be committed to effectively implementing them.*
- *Develop technologically advanced facilities and products that service consumer desires and therefore meet customer needs.*
- *Manufacture the best cigarettes in the world and through marketing, let the world know we do.*
- *Fight for a social environment in which the adult choice to smoke is respected and our right to market is preserved.*
- *Be cost conscious and efficient in all aspects of business.*
- *Maintain the highest legal, moral and ethical standards in everything we do.*

2026230110

These goals and the five-year financial goals that follow form the basis for the development and implementation of the R&D strategic goals outlined in this plan.

PM USA Five Year Goals

The latest PM USA Sales Forecast outlined objectives for the next five year period. These 1995 goals are as follows:

<u>PM USA</u>	<u>Volume</u>		<u>Percent Change</u>	<u>Market Share</u>	
	<u>1991</u>	<u>1995</u>	<u>1991-1995</u>	<u>1991</u>	<u>1995</u>
Total Full Margin:	190.8	185.3	-2.9%	37.6	40.7
Total Price Value:	30.5	40.7	+33.4%	6.0	8.9
Total PM USA:	221.3	226.0	+2.1%	43.6	49.6

Industry

Total Full Margin:	397.7	323.4	-18.7%
Total Price Value:	110.2	132.1	+19.9%
Total Industry:	507.9	455.5	-10.3%

These figures forecast a sales performance that significantly exceeds that of the overall industry. In addition, market share rises modestly in all categories over the next five year period. These goals can only be achieved with a proactive and aggressive response to marketplace demands. Strategies important to the achievement of these goals include the strategic completion of existing brand families; penetration into markets underrepresented by PM; the development of new market segments which provide benefits to consumers; and the development of products which address external requirements facing the industry.

2026230111

B. R&D RESPONSIBILITIES

To support the Company mission and goals, R&D has three main responsibilities:

- **Support present product lines.**
- **Improve existing products and processes for both domestic and international markets.**
- **Develop new technology-driven products to satisfy future consumer wants and external requirements.**

2026230112

Status Review

2026230113

C. STATUS REVIEW

R&D supported work toward a number of key issues in the 1990-1994 Operations Plan. The issues and the R&D response during the past year are summarized below:

Government Regulations/Domestic:

Ignition Propensity - The Fire Safe Act of 1990 (Moakley *et al.*) was passed by Congress and signed into law by the President. Funding for this bill was approved in October, 1990. This Act provides for the development of a standard test method to determine cigarette ignition propensity, compilation of data using this test, and laboratory studies on computer modeling of ignition physics. The PM R&D actions pertaining to this issue involve the close monitoring of this Act and any future legislation relative to this issue, internal test development, modeling, product prototype development and support of the industry position.

Ingredients - The Waxman Bill was transformed into what was known as the Whittaker Bill. However, the Whittaker Bill is currently dead but will very likely be reintroduced in the Spring of 1991 by another member of the House Subcommittee on Health and the Environment due to Mr. Whittaker's retirement. The Whittaker Bill called for changes in the wording and appearance of warning labels, a variety of advertising restrictions, as well as the labeling of the top ten ingredients in each brand and the monitoring of ingredients by the Secretary of Health and Human Services. The Kennedy Bill also involves regulations relating to ingredients and advertising. More specifically, the current version of the Kennedy Bill establishes a Center for Tobacco Products as part of the Center for Disease Control, proposes to regulate ingredients and require food-type labeling, and deals with issues relating to advertising and sale to minors. Like the Whittaker Bill, the Kennedy Bill is dead in 1990, but will likely be reintroduced in the Spring of 1991. R&D's actions pertaining to this issue includes the close monitoring of this potential legislation, the management and reduction of the ingredients list, the Flavor Specification Program which is part of the Operations Support Program, and the investigation of alternate flavor systems. Significant progress has been made toward a net reduction in both the Philip Morris and Industry ingredients list as outlined in Table 1. The Flavor Specification Program involves the analysis of all flavors used by PM USA and the establishment of specifications with the appropriate vendor. Alternate flavor systems are formulated to assure quality and support flavor consolidation efforts whenever possible.

2026230114

Table 1

Ingredient List Reductions

PM	<u>Date</u>	<u>Reduction from Previous Year</u>	<u>Cummulative Reductions</u>
	1986	-11.4%	
	1987	- 7.1%	
	1988	- 5.8%	
	1989	- 7.0%	-28.0%
	1990 (Projected)	- 2.0%	

Industry	<u>Date</u>	<u>Reduction from Previous Year</u>	<u>Cummulative Reductions</u>
	1986	- 6.6%	
	1987	- 8.0%	
	1988	- 2.8%	
	1989	- 2.4%	-19.0%*

*Net Reduction: Some items added/some deleted.

2026230115

Government Regulation/Export

Tar, Nicotine and CO - During 1990, regulations or agreements have been instituted in Singapore (1.3 mg/cigt nicotine, 25 mg/cigt tar ($\pm 15\%$) maximum) and Australia (1.4 mg/cigt nicotine, 14 mg/cigt tar, 20 mg CO maximum). R&D actions that dealt directly with these situations involved the repositioning of twenty packings in Singapore and several packings in Australia. Other R&D actions directed toward this issue include the development of Tobacco Institute of Japan test methods for tar, monitoring the harmonization of the EEC in 1992, utilizing ART to adjust nicotine delivery where necessary, investigating CO catalysts for the reduction of CO in smoke, and our Low Tar/High Flavor Program.

Ingredients/Labeling - The following countries have cigarette-related regulations: Austria, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Yugoslavia, Egypt, South Africa, and Tanzania. R&D actions/involvement dealing with the various changes necessitated by these regulations include monitoring the legislative situation in the various countries, ingredients list management and reduction to ensure the list meets the strictest regulation for each ingredient, certification of flavors on sheet materials in Germany, formulation of alternate flavor systems, monitoring the EEC 1992 harmonization, and pulling out of Canada when regulations were instituted requiring labeling by brand.

Capacity

R&D's role involves the development of new or improved processing methods. In addition, R&D supports product specification activities and the evaluation of product component changes. Specific activities include the Cast leaf Program, New Primary Process Program and product specification and standardization. Addressing capacity issues is a major objective of each of these programs.

Quality

R&D is involved in providing the capability to monitor visual, chemical and biological product specifications. R&D programs involved in this effort include Optical Processing, New Expanded Tobacco, Offset Printed Package Materials, Process Remote Sensing and Control, and components of Operations Support (Entomological Support, Microbial Quality Improvement, Adhesives/Flavor Specifications, Materials Evaluation and Customer Complaints).

2026230116

Cost Efficiency

The main R&D activity in this area involves the consolidation/simplification/substitution of product components wherever possible. Domestic activities involve the evaluation of wood pulp in paper; alternate filter tow and paper filters in selected products; and the standardization of filter configurations and specifications.

In the export market, R&D has been involved in evaluating blend consolidation possibilities. The different blends utilized for products currently marketed in Asia are listed below:

Japan:	L&M Parliament Mount Lark
Korea:	Lark Marlboro
Taiwan:	L&M Marlboro
Hong Kong:	Marlboro Marlboro Menthol Merit Mount

An evaluation of these blends indicates that there is no opportunity for blend consolidation with the current blends. Some small volume specials might be candidates for consolidation. R&D will evaluate the possibility of eliminating a tropical OV specification on cigarettes, especially 83 mm Box products.

Support of Established Product Lines

Through mainly our Domestic Product Development and International Product Support Programs, R&D has been involved in a number of support activities directed toward our current brands. These include: line extensions (Marlboro Menthol 83 Box, Alpine Full Flavor and Lights 83 Box, Bristol, Cambridge KS 6 mg); ingredients evaluation, reduction, and consolidation; Cambridge blend modification; evaluation of alcohol reduction in flavors (Project Grain); evaluation of wood pulp papers; repositioning Cambridge UL 100's from 5 mg to 6 mg; support for Bucks test market and national

2026230117

introduction; consumer panel testing; RL evaporator upgrade qualification; P&S dryer throughput qualification; carbon testing for Lark; combining wrap to improve efficiencies for Lark; Danchi Panels; Seoul Consumer Panel; and the Hong Kong Consumer Panel.

Environmental Regulations

The PM USA Operations Plan listed a number of objectives related to environmental issues which involved the support of R&D. These include the development of a comprehensive air emissions and solid waste management plan, the maintenance of compliance relative to all environmental regulations and the development of a proactive plan to address potential future regulations. Specific areas identified to receive attention include nitrates/phosphates in effluents, emission of CO₂ and volatile organic compounds, and product biodegradability. R&D has significantly increased involvement in the environmental area in the past year. Key activities involving R&D include the preparation of a draft of the five year Environmental Health and Safety Plan in coordination with E&EP, Engineering and R&D; evaluation of a 30% reduction in alcohol utilization in flavor systems (Project Grain) and the impact on product subjectives (Cambridge POL); evaluation of heavy metals in inks and paper products; method development and evaluation for the disposal of nicotine generated from the ART process; support for the implementation of 100% Kabat® in order to eliminate the need for phosphine fumigations; evaluation of the potential to recycle sludge from the Park 500 waste water treatment facility as a pelletized fertilizer; effluent evaluation and process modifications initiated with the Cast Leaf Program; CO₂ emissions reduction as an objective of the New Expanded Tobacco Program; and product/packaging biodegradability evaluation. Biodegradability is not being pursued at this time because technology is not currently available which could achieve this goal and yet maintain product integrity. Furthermore, the solid waste of PM USA products represents a minor component (3%) of the PM Corporate product waste issue. In addition, R&D has ordered a hazardous waste compactor which will significantly minimize solid waste volume and the cost associated with the disposal of laboratory waste.

Modernization and Technology

The Operations Plan objective is to "...apply R&D results to advance the manufacturing process." Toward this objective R&D has been involved in a number of relevant activities in the past year. Optical inspection systems for print, web, and packs are currently under development as part of our Optical Processing Program. A second generation scrubbing system for the ART process is currently under development. Process development has provided new primary design support. In addition, two new major programs have been initiated in R&D to address capacity, quality and

2026230118

environmental issues associated with the RCB (Cast Leaf Program) and ET (New Expanded Tobacco) processes. In addition, the R&D Strategic Planning Committee, in conjunction with Senior Technical Staff in R&D, has undertaken an extensive review of in-house capabilities, technologies currently under development in-house, technologies available externally, and strategic technologies needed to accomplish goals and objectives. The information generated from this process is included in the appropriate sections of this plan. Finally, an action plan was developed (see Implementation Section and Appendix P) which provides a mechanism for the continued evaluation and implementation of technologies in our products, processes, and business operations.

Technology-Driven Products

An objective was assigned to R&D in the Operations Plan to "develop new high technology product concepts." R&D action on this objective during the past year has involved a large variety of technology-driven products. As part of the Low Tar/High Flavor Program, the specialized BOLD filter, a concentric filter with a paper core, allows for a high filtration and low pressure drop which results in increased impact and strength when tested relative to Now and Carlton. The Paper Technology Program has developed a paper which reduces sidestream smoke when used as a single wrap. The Virginia Slims Superslims product, which is currently under patent infringement litigation with B&W, may benefit from this technology. Project Sigma, development of a novel article with a chemical heat source, has been completed, and product evaluation efforts are underway. Many of the personnel previously working on Sigma are now assigned to Project Beta to form a Beta Team as outlined in the Beta Plan (See Appendix A). Project Ambrosia involves the development of a product with modified sidestream aroma that is superior to Chelsea and Horizon. In addition, products with reduced aroma and sidestream are being developed. Project ART technology has resulted in the development of products with most of the nicotine removed. In addition, products based on nicotine segmentation (Half-Nic) are currently under development. Finally, studies are underway to determine the optimum tar/nicotine ratios for nicotine segmented products.

Potential Future Technology-Driven Products

In the past year, efforts relating to future extensions of currently utilized and/or developing technologies have been initiated. For the ART process, future uses of this technology could involve the introduction of a variety of low nicotine brand extensions, utilization of ART material to meet nicotine delivery regulations, and potential introduction into the Japanese market. Other applications of ART technology could involve the removal or reduction of other tobacco components (i.e. TSNA precursors) and/or utilization for flavor impregnation to assist with flavor enhancement in Low

2026230119

Tar/High Flavor products. BOLD filters could be utilized on other products in the 3-5 mg tar delivery range to enhance strength and impact ratings. The evaluation of BOLD filters on an ART product may also yield a potentially successful combination of these two technologies. The use of BOLD-type filters to control filtration and "design" a product delivery system when coupled with blend, flavor and configuration modifications represents an opportunity to optimize low tar product subjectives. Finally, Project Ambrosia technology could be extended to include products with distinctive aroma and low visible sidestream, or products in which the sidestream aroma is masked or made neutral.

Summary

Based on R&D involvement in 1990 in these Operations Plan issues, an assessment has been made relative to the extent of our future support of these issues. Clearly, R&D will need to increase support of the environmental issues facing the Company, particularly in the area of developing a proactive position toward addressing potential regulations. In addition, the changes instituted by other departments to meet environmental goals will impact R&D in product support and evaluation areas and in the Operations Support program when qualification of changes relative to materials evaluation and product subjectives will be required. However, based on a thorough evaluation of the biodegradability issue, R&D support will be limited to monitoring the relevant technology as it becomes available. R&D Support for all other operations plan issues is expected to continue at the current level.

2026230120

Internal Analysis

2026230121

D. INTERNAL ANALYSIS

R&D Programs

The 1990 PM USA R&D programs were formulated at the December, 1989, R&D Quarterly Planning Conference. The following major programs were approved for 1990:

1. Project ART
2. Project Sigma/Beta
3. Domestic Product Development
4. International Product Support
5. Operations Support
6. Paper Technology/Reduced Sidestream
7. Project Tomorrow
8. Optical Processing
9. Low Tar/High Flavor
10. Filtration Research
11. Cast Leaf
12. New Expanded Tobacco
13. Tobacco Specific Nitrosamines (TSNA)
14. Lowered Biological Activity (LBA)

One program, the Reduced Density Rod Program, was completed after a thorough evaluation indicated there were no clear product advantages for this technology at this time. Individuals working in this area changed focus to address pressing issues in the Cast Leaf and New Expanded Tobacco major programs which have been added as major programs in 1990. In addition, Project PACT, although not considered a major program relative to resource allocations, continued to receive R&D support. Project PACT relates to the development of efficient room air handling systems to minimize the effects of environmental tobacco smoke in public places. Significant progress was made toward its objective in 1990; therefore, R&D support toward this Corporate Affairs initiative is expected to continue to a lesser degree in 1991.

In addition to the major programs, a percentage of the R&D Staff is devoted to "other programs." These programs, which generally have only a few individuals assigned to each program, have two different functions. One group of programs includes small projects which are necessary to support our current business; whereas the second group involves long-term research efforts that are anticipated to develop into major programs in the future. These programs and their functional classification are shown in Table 2. It is important to stress that these "other programs" are as important to the fulfillment of

2026230122

Table 2

Other Programs
1990

Support Our Current Business

- Ingredients
- Menthol
- Project Ambrosia
- Reduced Tar and Nicotine International
- Process Development Studies
- Flavors
- Project Natural
- New Packaging Concepts (Tamper-Evident)
- Process Control Systems
- Project PACT
- Environmental Issues

Long-Term Research Seed Projects

- Selective Filtration
- Combustion Research
- Aerosols
- Selective Separations
- Consumer Testing Research
- Chemical Senses
- Biological
- Computing Systems
- Basic Analytical Research

2026230123

PM USA's R&D goals as are the major programs. All of PM USA R&D's programs are designed to support the PM USA R&D Strategic Plan.

R&D Resources

A comparison of R&D program direct resource allocations for 1989 and 1990 as a percentage of R&D staff is given in Table 3. Also given in Table 3 are the predicted resource allocations for 1990 which were estimated in 1989. The resource allocation process was computerized in 1990 to facilitate the input and sorting of the data and to ensure consistency in data handling processes. The automation of this process has allowed for more flexibility in the utilization of the data; therefore, allocations listed from 1990 on include both directly allocated and support resources in the figures assigned to each program.

Inspection of Table 3 indicates that only "other programs" and the two programs added in 1990 have significantly more resources allocated to them in 1990 than in 1989. The increase in "other programs" represents a small but significant increase in the evaluation of technologies that may enhance our efficiency and new product development efforts.

Significantly fewer resources were devoted to Project ART in 1990 than originally predicted in 1989. Quite simply, the additional resources that went to the two new programs, Cast Leaf and New Expanded Tobacco, account for the fewer resources in Project ART and Operations Support. The development of a product that would be competitive with RJR's Chelsea, as well as the capacity issues associated with the RCB and ET processes necessitated significant resource allocations to these programs. Project Sigma is to be completed in 1990 to allow for the shifting of resources to form the Beta Team (Appendix A).

International Product Support and Domestic Product Development received more resources than originally predicted. International sales, new markets in the Far East and Russia, and the need to modify products to meet a variety of government restrictions have led to a significant increase in the resources needed to meet these objectives. Also, Domestic Product Development was heavily involved in ART product development for 1990. In addition, more resources were allocated to the New Expanded Tobacco Program due to the time priorities involved.

Table 4 shows the actual number of personnel assigned to the R&D major programs. Resources were allocated to each program by the responsible manager based upon the best available information. The resources were then sorted by computer into the programs, and the Program Coordinators were asked to review the resources allocated to their programs during the plan period. In some cases, such as the Tobacco Processing

Table 3
Comparison of Resource Allocations
1989-1991

	1989 (Actual) (%)	1990 (Actual) (%)	1991 (Estimated) (%)
Project ART	14.5	10.9	7.9
Project Sigma/Beta	9.2	8.0	6.4
Domestic Product Development	12.7	13.1	13.2
International Product Support	9.5 ¹	10.5 ¹	10.5
Operations Support	14.7	14.3	14.2
Paper Technology/Reduced Sidestream	10.6	8.2	7.9
Project Tomorrow	1.2	1.7	3.3
Optical Processing	1.4	1.3	1.4
Low Tar/High Flavor	2.2	2.1	2.3
Filtration Research	3.0	1.9	1.5
Reduced Density Rod	4.5	—	—
Cast Leaf	—	2.1	3.0
New Expanded Tobacco	—	5.2	8.0
TSNA	4.7	4.3	4.0
LBA	2.9	3.2	2.4
Other Programs	8.8	13.2	14.0

1. Includes QZ Personnel

2026230125

and Fabrication Division (Semiworks), resources were directly allocated to each major program based upon the percentage of requests from each major program. In other cases, such as the Computer Applications Division, resources were allocated as support according to the division or program headcount. Table 4 shows the 1990 resource allocations for R&D programs giving direct resources, support, and total resources.

Both Operations Support and Other Programs are composed of a number of small projects. Projects included under Operations Support are shown in Table 5 along with allocated resources. Projects included under Other Programs and their resource allocations are shown in Table 6. As already pointed out, the number of resources allocated for Other Programs has increased in 1990. The increase is spread out among many divisions and represents an increased involvement in virtually all divisions in Other Programs.

PM Europe R&D

An additional internal resource to PM USA is PM Europe R&D. A copy of the PM Europe Strategic Plan is included in Appendix B. Highlights of that plan are summarized below.

There is considerably more emphasis in the Philip Morris Europe R&D 1991-1993 Strategic Plan on government regulations than there has been previously, particularly with respect to environmental concerns and compliance with emerging product legislation. The Product Development Department has been charged with developing and implementing a program in order to reduce tar deliveries of all brands if needed to ensure compliance with the 1993 EEC tar ceiling regulations. In addition a long-term plan will be developed with the objective to further reduce tar deliveries to be in compliance with the 1997 EEC tar ceiling regulations. The Research Department will maintain and continue to upgrade the monitoring program for chemical constituents in all materials going into the fabrication of a cigarette so as to be in complete compliance with specific laws within PME. They have also been charged with centralizing and computerizing, in cooperation with PM USA, information regarding legal situations and requirements in the fields of pesticides, additives, and packaging materials for all EEC and EEMA markets, in order to be able to immediately react to legal changes.

Product quality continues to be a major issue. The Quality Assurance Department will concentrate on programs which will result in product quality improvements. These programs include rating of suppliers, training of QA personnel in affiliates and licensees, and improved supervision of sanitary conditions of leaf purchases. An improved and standardized European system for the evaluation of consumer complaints will be

Table 4

Total Resource Allocations for PM USA R&D Programs
Calendar 1990
As of October, 1990
(Numbers of individuals^{1, 2})

	Direct	Support ¹	Total	%
Project ART	48.6	18.9	67.5	10.9
Project Sigma/Beta	35.8	13.9	49.7	8.0
Domestic Product Support	58.5	22.7	81.2	13.1
International Product Support ²	58.1	6.6	64.7	10.5
Operations Support	63.4	24.6	88.0	14.3
Paper Technology/Reduced Sidestream	36.6	14.2	50.8	8.2
Project Tomorrow	7.6	3.0	10.6	1.7
Optical Processing	5.8	2.2	8.0	1.3
Low Tar/High Flavor	9.4	3.6	13.0	2.1
Filter Research	8.5	3.3	11.8	1.9
Cast Leaf	9.4	3.6	13.0	2.1
New Expanded Tobacco	23.2	9.0	32.2	5.2
TSNA	19.2	7.4	26.6	4.3
LBA	14.4	5.6	20.0	3.2
Other Programs	58.3	22.6	80.9	13.2
	456.8	161.2	618.0	100.0

1. Includes 43 executive and administrative personnel

2. Includes 41 QZ personnel

Table 5

Distribution of Directly Allocated Resource Allocations
for the Operations Support Program
1990

	No. of Personnel	%
Environmental Compliance/Mono Inks	3.9	6.2
Semiworks Support	17.2	27.2
Entomology	6.3	9.9
Alternate Humectants/Preservatives	5.3	8.4
Materials Evaluation	8.3	13.1
Customer Complaints	1.8	2.8
ETS	2.1	3.1
Flavor Specifications/Certifications	7.1	11.2
Cigarette Monitoring	1.5	2.4
Micro Quality Improvement	2.7	4.3
Burley Spray/Dry Flavors	0.5	0.8
Flavor Development/Analytical Support	1.8	2.8
Cooperative Leaf Studies	1.5	2.4
Project Warhol	0.7	1.1
Engineering Studies/Methods	2.0	3.2
Recon Sheet Certification	0.7	1.1
Total	63.4	100.0

2026230128

Table 6
Distribution of Directly Allocated Resources
in Other Programs
1990

	No. of Personnel
Project PACT	2.8
Project Natural	11.5
Environmental Issues	5.5
Ingredients	2.0
Menthol	6.0
Project Ambrosia	7.4
Reduced Tar and Nicotine, International	11.7
Selective Filtration	11.4
New Packaging Concepts	0.2
Process Development Studies	11.9
Combustion Research	0.6
Flavors	6.0
Aerosols	4.6
Selective Separations	2.4
Consumer Testing Research	2.5
Chemical Senses	11.8
Measurement and Sensing of Physical and Chemical Character (Process Control Systems)	2.5
Biological	3.2
Computing Systems	2.8
Basic Analytical Research	1.5
Total	58.3

2026230129

developed and used as a quality management tool. This last assignment will be carried out in conjunction with Sales and Marketing.

Emerging technologies which will have emphasis include a new triple tube-in-tow filter, which significantly flattens the puff-by-puff profile, and total blend expansion. Considerable work will be done on filters for low delivery products including concentric filters, tobacco sheet filters, and CA-web filters

Considerable priority will be placed on consumer research. In a combined effort with Marketing Research France, a new questionnaire, to be used in Product Test Research, has been developed and successfully tested. A study, using the French market as a model, was initiated and conducted with the objective of correlating market dynamics, measurable product parameters, and subjective attributes based on sensory evaluation. The outcome of this study will provide a better and more accurate understanding of consumer perceived product performance.

A major responsibility for the Process Development Department during the next few years will be to focus on capacity issues. A capacity increase program for primary processing equipment will be implemented in coordination with the PME affiliates. A number of engineering projects are planned, including the primary extension and the new ET plant in BOZ, the installation of LEGG driers in Berlin, the BBS processing and cut filler pack-out in Munich, the separate ET line in FTR Onnens, and the FTR primary improvement program.

Technology Review

Technological information and capabilities available to PM USA R&D come from many sources. Maximizing the efficient utilization of all of these sources is associated with the maintenance of a competitive position in this fast moving area and is essential to the development of proprietary technology driven products. A thorough review of all sources of technology currently available to PM USA R&D is listed in Appendix C. More specifically, the following compilation will be found in Appendix C:

1. Areas of Particular PM USA R&D In-House Expertise
2. PM USA R&D Collaborative Research Programs - 1990
3. Consulting Relationships - 1990
4. Visiting Scientists - 1990
5. Science and Technology Areas Currently Under Development at PM USA R&D
6. Technology Assessment

2026230130

In 1990, the PM USA R&D Strategic Planning Committee, in conjunction with senior technical staff, undertook a thorough review of technologies currently available to R&D (Appendix C), technologies developing externally (Analysis of Future Factors Section and Appendix D), the technology needs of R&D programs or Strategic Technologies (Analysis of Future Factors Section and Appendix E), and an Action Plan (Implementation Section and Appendix P) on handling technology evaluation in the future.

R&D Patents and Publications

During the period July, 1989 to July, 1990, a total of 23 tobacco-related patents were granted to Philip Morris, Incorporated by the United States Patent and Trademark Office. In addition, patents were granted to Filter Materials Limited (1); Fabriques de Tabac Reunies, S.A. (FTR) (1); and one design patent to FTR. Three defensive disclosures were published during the past year. Defensive disclosures are generally pursued for subject matter when Philip Morris wants to maintain the right to use but does not necessarily want to preclude others from using.

Areas in which Philip Morris demonstrates technology leadership, as evidenced by its issued patents, include make/pack improvements (7 patents); optical processing (5 patents); cigarette pack technology and design (5 patents); and flavor synthesis (4 patents). Three filter-related patents and two product/process patents were also granted.

Issued patents, by title and technology category, are listed below. The first page of each patent may be referred to in Appendix F.

1. Filter Technology

USP 4,848,375 - Filter Cigarette

USP 4,869,276 - Hinged Filter Sleeve

USP 4,925,602 - Method for Improving the Crimping of Polyolefin Filter Tow
(Filter Materials Limited)

2. Flavor Synthesis Technology

USP 4,859,775 - Process for Preparing Acylpyrazine Ethers

2026230131

USP 4,872,917 - Scleral Alkyl Ethers and Smoking Compositions Containing a Scleral Alkyl Ether Flavorant

USP 4,872,918 - Heterocyclic Esters and Smoking Compositions Containing a Heterocyclic Ester Flavorant-Release Additive

USP 4,925,985 - Process for the Production of 4, 6-Dimethyl-7-Hydroxynonan-3-one

3. Packaging Technology

USP 4,843,801 - Method and Apparatus for Opening Closed Containers (Pack Opening Device)

USP 4,850,482 - Cigarette Box Innerframe

USP 4,923,059 - Hinged-Top Cigarette Box

USP 4,938,363 - Outer Wrapper Containing an Integral Tear Tape

Design Patent 303,722 - Pack for Cigarettes (Fabriques de Tabac Reunies, S.A.)

4. Make/Pack Technology

USP 4,850,749 - Airlock Having Flaps in Continuous Feed of Material Carried by a Gas Stream While Obstructing Free Flow of Gas

USP 4,875,495 - Separation of Light Particles from Heavy Particles in a Stream of Particulate Matter

USP 4,895,603 - Apparatus and Method for In-Place Cleaning and Priming of a Nozzle Assembly (Glue Nozzles)

USP 4,911,028 - Apparatus for Automatically Stripping Sheet Material From a Bobbin

USP 4,911,374 - System and Method for Use in Delaminating Bobbins for Paper Material

USP 4,932,423 - Tobacco Feeding Apparatus (Fabriques de Tabac Reunies, S.A.)

2026230132

USP 4,934,624 - Robotic Hand

5. Optical Processing/Quality Measurement Technology

USP 4,890,053 - Method and Apparatus for Detecting a Missing Object in a Set of Objects

USP 4,906,099 - Method and Apparatus for Optical Product Inspection

USP 4,928,181 - Methods and Apparatus for Optically Enhancing Selected Features in an Input Image

USP 4,930,344 - Apparatus for Testing the Quality of a Seal on a Package Overwrap

USP 4,942,363 - Apparatus and Method for Measuring Two Properties of an Object Using Scattered Electromagnetic Radiation

6. New Products/Processes

USP 4,874,000 - Method and Apparatus for Drying and Cooling Extruded Tobacco - Containing Material

USP 4,936,920 - High Void Volume/Enhanced Firmness Tobacco Rod and Method of Processing Tobacco

7. Defensive Disclosures

Pinned Feeder Cleaning Arrangement

Bulk Tobacco Handling System for Transporting Tobacco Between Facilities

Improved Pneumatic Separator

As of July 1, 1990, there were 86 patent applications (assigned to P.M., Inc.) pending in the United States Patent and Trademark Office. During the past year, a total of 27 new applications were filed and one each divisional, continuation and continuation-in-part were filed. Patent activity should escalate during this plan period due to the large number of disclosures being submitted, as well as the addition of one patent attorney to the Corporate Patent Group.

2026230133

Expeditious review of new invention disclosures by R&D management jointly with Engineering management on a monthly basis coupled with an accelerated filing effort by the Patent staff and outside attorneys should result in a stronger patent position for P.M., Inc. in the near term (i.e., two to three years out). Sustained effort is required to ensure adequate protection of P.M., Inc.'s proprietary/intellectual property as well as its right to produce and market new technology-driven products.

Research findings for which patent coverage is not pursued are generally published in scientific journals and/or presented at scientific meetings and seminars. During the past year, 25 papers were authored by R&D personnel and published in appropriate scientific journals. Many of the published papers reflect R&D's collaborative research efforts with outside universities and consultants and are representative of the varied fields of expertise of the R&D staff and the department's contacts with scientific investigators throughout the world. Subject matter published ranges from physics/physical chemistry (7 papers) to cell wall and biotechnology research (6 papers) to papers on the science of sensory perception (4 papers). A listing of published papers by category, titles and authors is compiled in Appendix F.

Technical Synergy

Status - The diversification of Philip Morris Companies has created the possibility of improving the effectiveness of the individual operating units through a number of synergies. One of these is technical synergy. In order to take advantage of potential areas of R&D overlap, a technical synergy effort was initiated in July, 1988, by the Research Vice Presidents of the operating companies. The goal of the group was to leverage the Corporation through joint/coordinated research activities in order to minimize duplication. The results of the effort have been many. The most important has been the establishment of an informal network of contacts between technical personnel within the operating companies. Catalogs have been established of existing technologies, emerging technologies being tracked, external resources utilized, and facility capabilities. A comprehensive evaluation of our competitors' research personnel, facilities, and activities has been developed and maintained. More applied results of this effort include numerous examples of successful technology transfer between operating units, several instances of joint technical problem solving, the Technical Symposium program, and exchanges of personnel.

In the past year, Technical Symposia have been held on Process Development, Packaging, and Preservation. A symposia on Product Development processes will be held this winter in Glenview, and a workshop and symposium on Microbiology is being organized by Company-wide microbiologists as a spin-off of the Preservation Symposium.

In addition to the many technical exchanges occurring between the Operating Companies of PM Companies, Inc., specific longer term personnel exchanges have taken place to exchange knowledge, communication, and technical synergy. Dr. F. del Valle, of General Foods, spent approximately eight months at PM USA R&D in 1989. In exchange, Dr. Walter Hempfling of PM USA R&D spent approximately five months in 1990 at the General Foods Central Research Facility in Tarrytown, New York. Dr. Hempfling's visit included extensive tours of the many and varied General Foods processing facilities. In addition, plans have been made for Dr. Hempfling to visit KGF at Glenview for approximately one month in 1991.

Specific technical exchange with the Miller Brewing Company is currently in progress. Dr. Patricia Bower of the Miller Brewing Company is functioning as a Visiting Scientist in the Biochemical Research Division of PM USA R&D. Dr. Bower's expertise in molecular genetics will be utilized in the Biochemical Alteration of Tobacco objective of the TSNA program. In addition, the facilities of the project, some of which are not readily available at Miller, will be utilized by Dr. Bower to complete a research project for the Miller Brewing Company.

Internal Analysis Summary

PM USA R&D Internal Strengths derived from this internal analysis are listed in Table 7. Internal Issues are listed in Table 8. Each Internal Issue has a corresponding action plan. These action plans are discussed in the Implementation Section of this plan and/or Appendix P.

2026230135

Table 7

Internal Strengths

- Broad scientific base augmented by recent new hires.
- Rapid response to short-term goals.
- Good short-term operational plans.
- Well-placed university contacts.
- Money available for justifiable programs.
- Considerable multi-divisional interactions.
- Good understanding of conventional cigarette construction.
- Technically strong staff.
- R&D programs focused.
- Planning oriented toward business objectives.
- Improved effort in alerting outside groups early with respect to technology transfer issues.
- Increased developmental opportunities because of a more flexible organization.
- Increased interaction with other PM Companies.
- Improved financial planning.

2026230136

Table 8

Internal Issues

1. Technology Management

Key dimensions of this issue include:

- Technology Assessment
- Personnel Skills/Mix/Change/Availability
- Training
- Utilization of External Resources/Suppliers
- Synergy
- Protection of Intellectual Property Rights
- Technology Transfer/Commercialization of Non-Traditional Products
- Communications

2026230137

External Analysis

2026230138

E. EXTERNAL ANALYSIS

Industry Highlights

Key historical information on industry and PM USA volume and market share, as well as the market share and share change of the top ten brands is provided in Figures 1-5. From 1988 to 1989, there was a 34.2 billion or 6.1% unit decrease in volume (Figure 1). This relatively large decline has been determined to result from three factors: the base decline in market, -2.8%; state excise tax increases (7% in California), -1.0%; and RJR's no load action in 1989, -2.3%. Therefore, the industry would have declined by only 3.8% if RJR had not stopped trade incentives in 1989. In addition, the price/value segment grew by 16 billion units or 25.8% in 1989. Figure 2 summarizes industry market share changes from 1988 to 1989. PM USA increased 2.6% to a 1989 market share of 41.9%. Logically, some of PM's market share gain resulted from RJR's large decline (-3.3%) due to their no load decision in 1989. If RJR had decided not to take this action, the PM USA market share for 1989 was projected to be 40.9%. A summary of the market share changes for each Company and the major determinants of that change are listed below:

PM USA	+2.6%	Marlboro Lights/Cambridge
RJR	-3.3%	All brands declined except Doral and Magna
B&W	+0.5%	Viceroy and Richland 20's
Lorillard	-0.3%	All brands declined except Newport
American	--	No change
Liggett	+0.5%	Pyramid gained; Generics lost share

An analysis of Figure 3, PM USA volume, indicates that full margin brands declined (4.7 billion units) at a slower rate than the total industry decline rate. PM USA price/value brands increased 4.9 billion units, due to Cambridge (+2.1) and Alpine (+2.8) volume increases. PM USA market share figures are shown in Figure 4. The top ten brands in the industry and their market shares are given in Figure 5. Rank order has not changed relative to 1988, and Cambridge now rates 13th in sales with a 2.3% market share.

2026230139

Figure 1
INDUSTRY VOLUME

2026230140

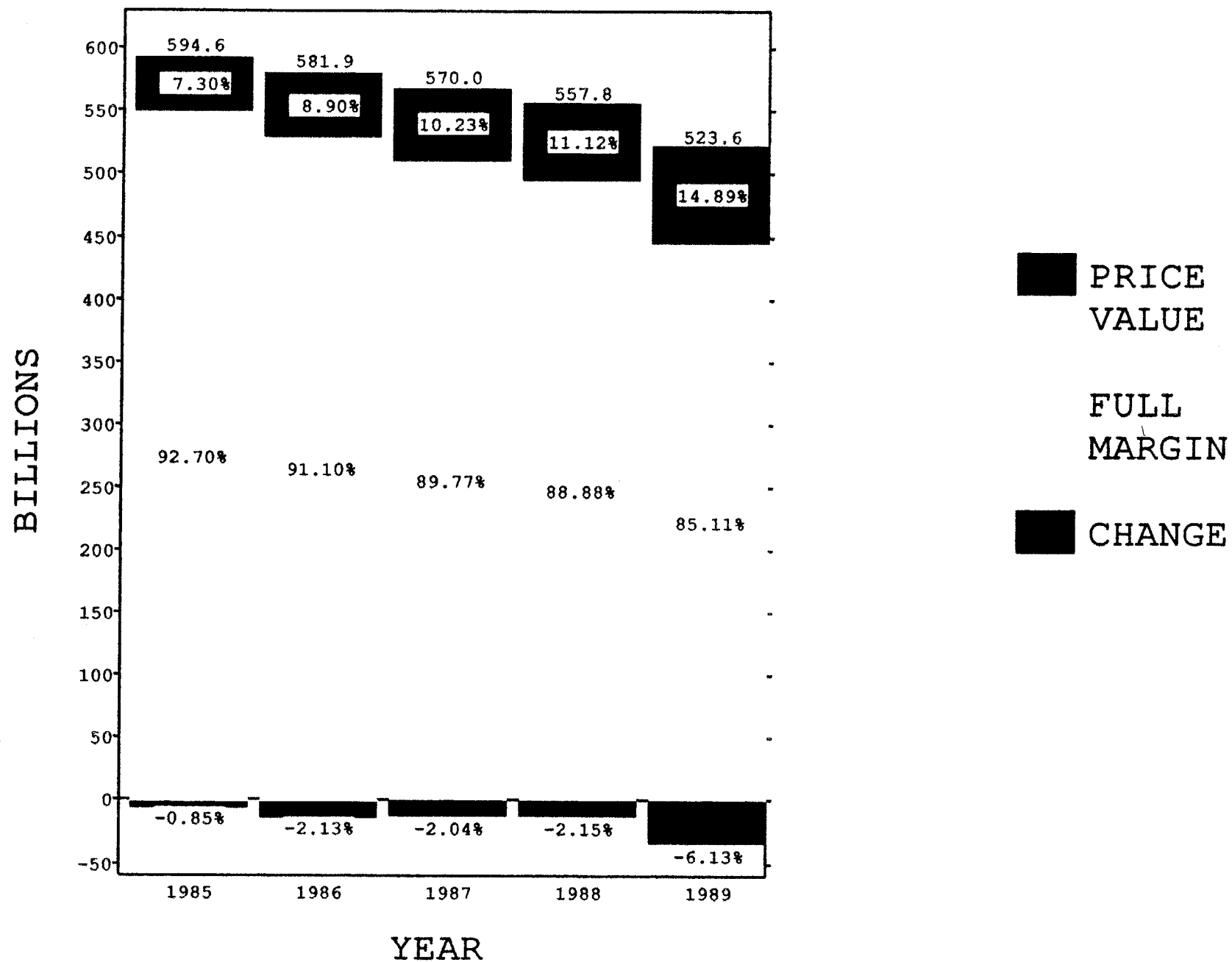


Figure 2

INDUSTRY MARKET SHARE

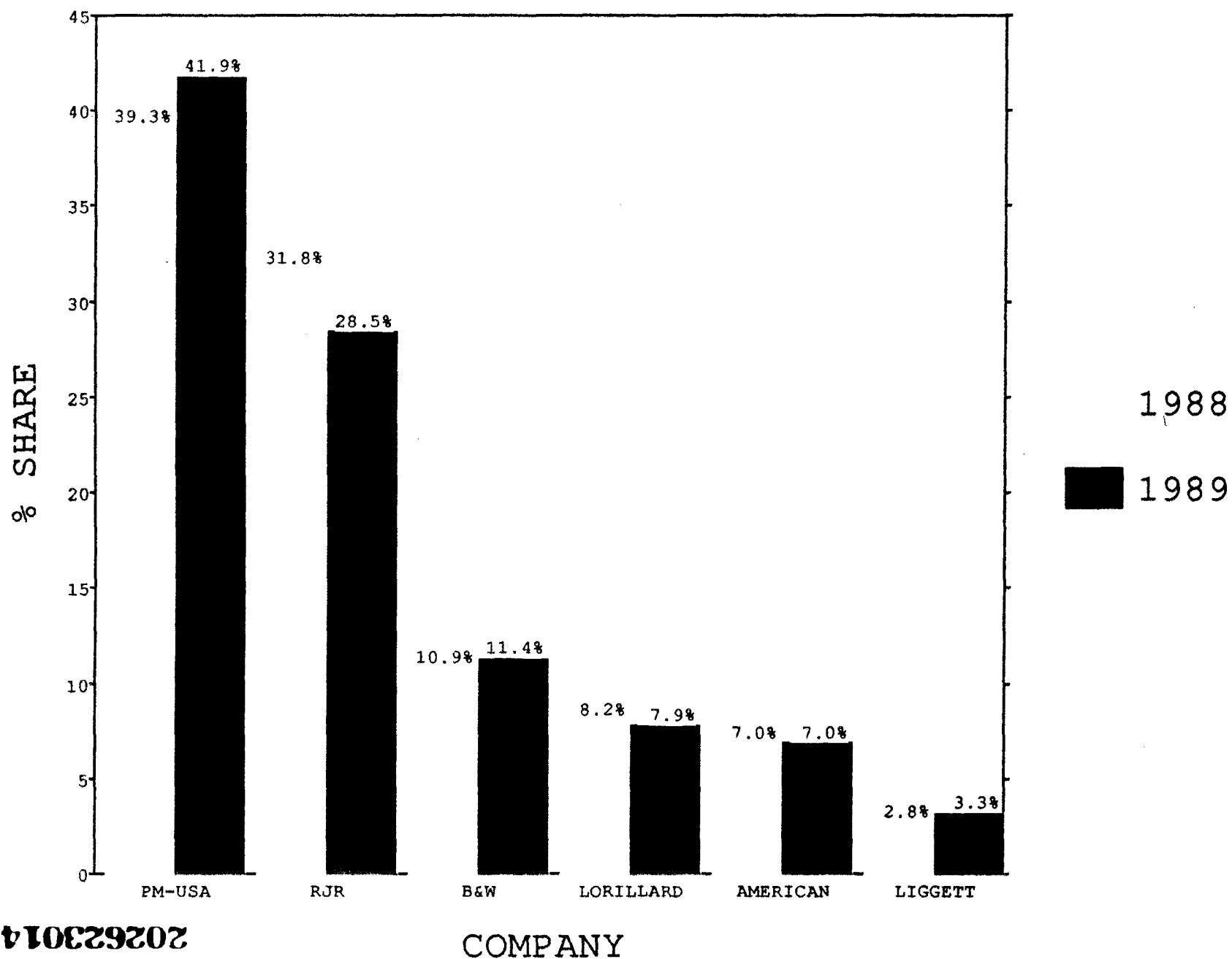


Figure 3
PM-USA VOLUME

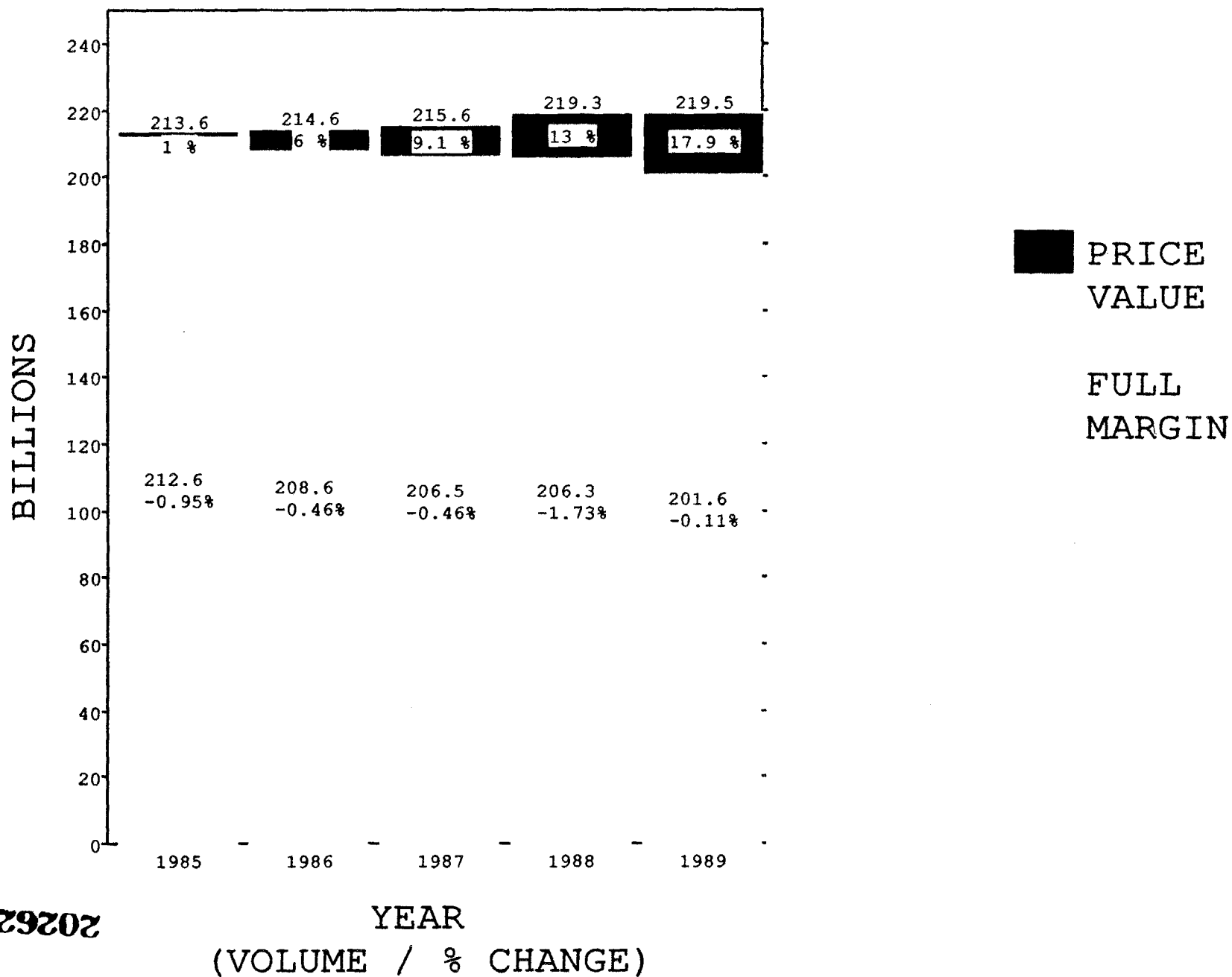


Figure 4
PM-USA SHARE

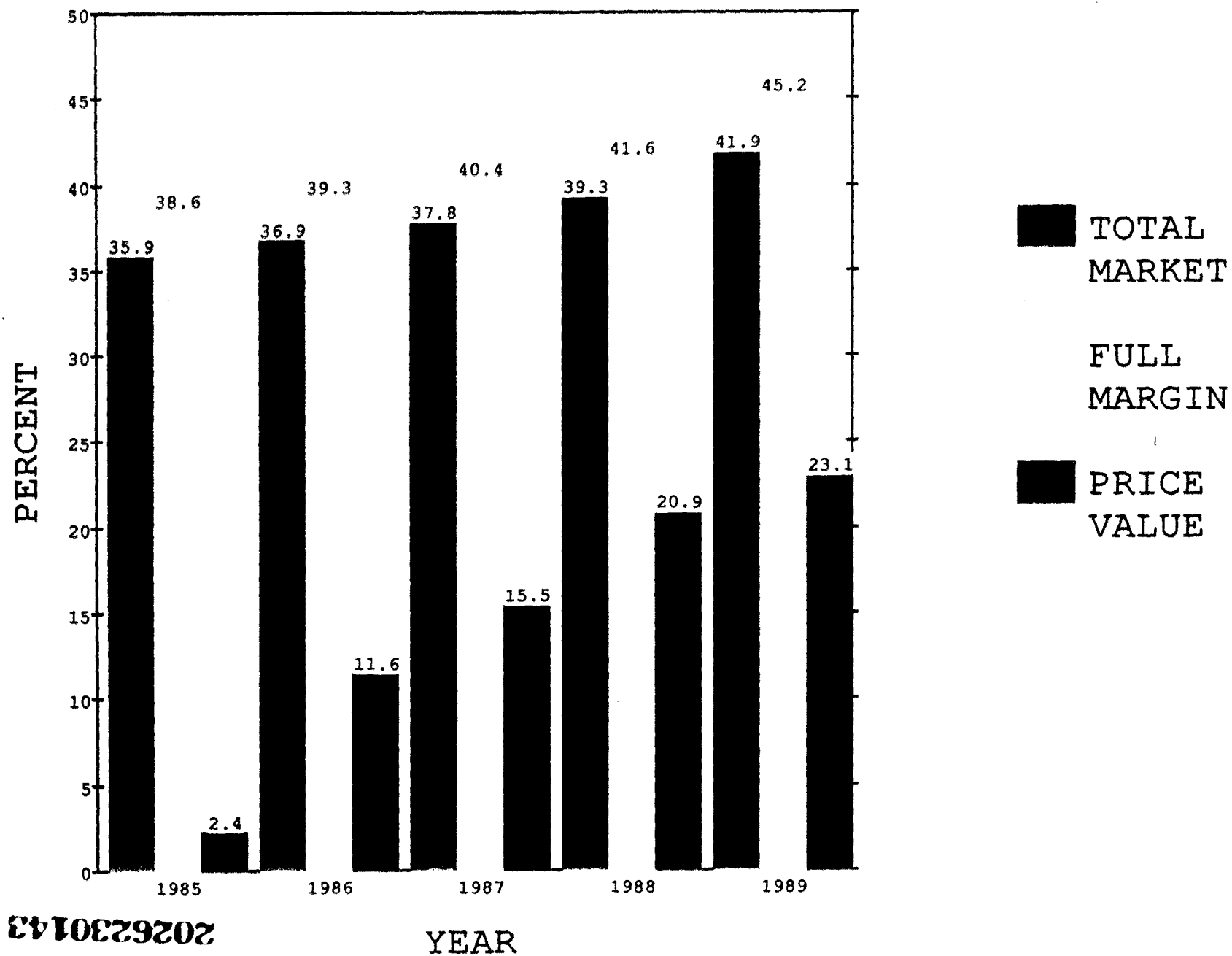
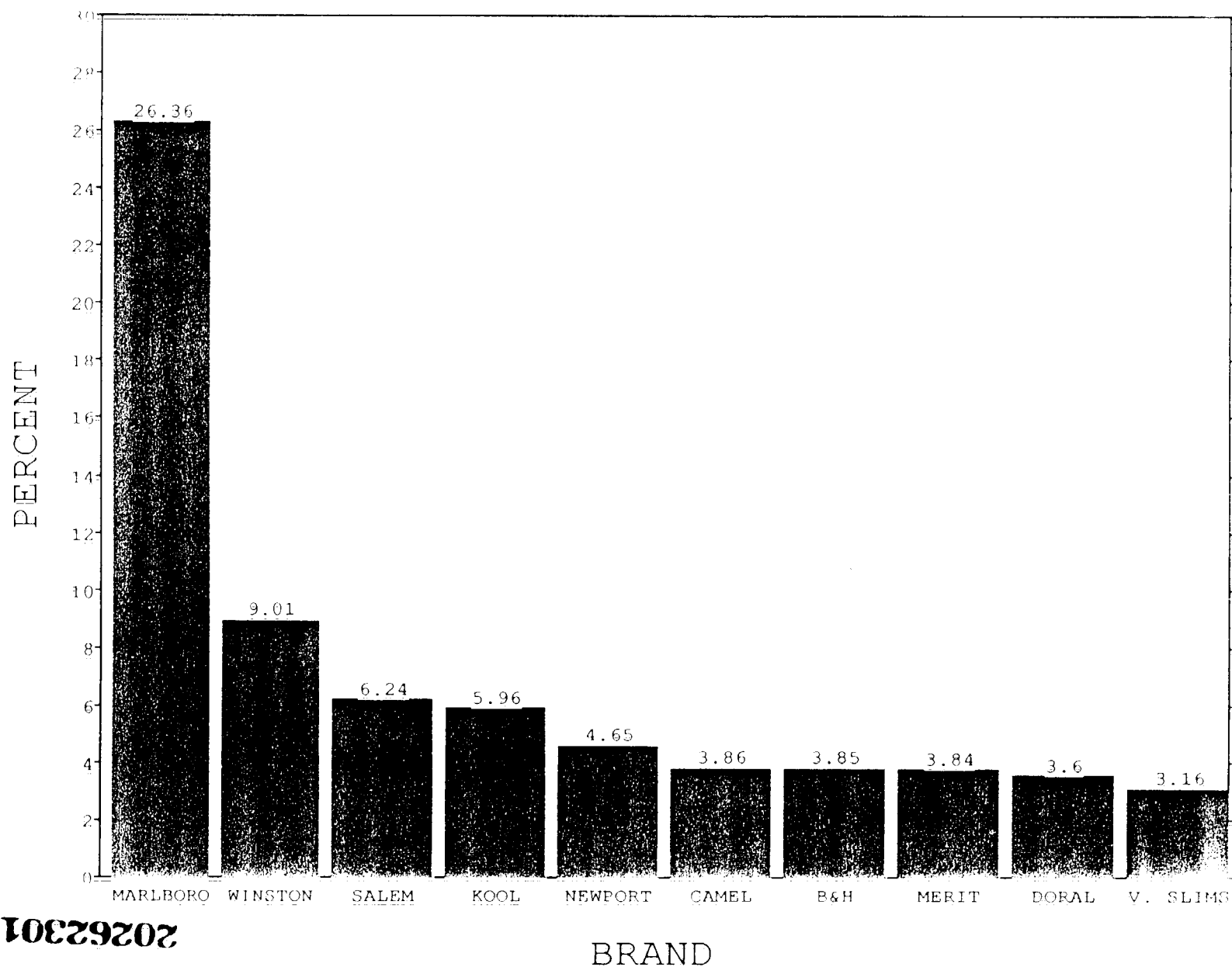


Figure 1
TOP TEN BRANDS
1989 MARKET SHARE



2026230144

Competitive Analysis

Our major competitors, both domestic and worldwide, have not changed since the preceding year, namely, RJR Tobacco, Brown and Williamson (BAT), and Japan Tobacco (JTI). All three remain active competitive threats. Information for each of these three companies will be summarized separately. Topics to be discussed will include new product introductions, R&D organization, patents and publications, and any information we may have which reflects on strengths and weaknesses.

RJR TOBACCO

RJR Highlights - As in 1989, RJR has generated more than its share of controversy during 1990. Early in the year RJR unveiled its plan to test market Uptown in Philadelphia, a brand that was admittedly targeted to black smokers. The reaction from black leaders on both the local and national level was swift and unexpected. RJR was severely criticized in the press for targeting a cigarette to a group which already was suffering disproportionately from health problems. RJR bowed to the pressure approximately one week later indicating that they were withdrawing the product from test market, since it would be impossible to obtain meaningful data from the test market relating to product performance. Not long thereafter a new controversy erupted over a second product to be test marketed by RJR. The product was Dakota, and the problem arose when a memo written by an advertising agency which referred to the new product as "Project Virile Female" was leaked to the press. The memo indicated that this new product was to be targeted at young females with a low socioeconomic status. The description of this group by the advertising agency was hardly complimentary. RJR weathered this particular storm and went ahead with their test market. The controversy has since apparently died down, although protests by groups within both North and South Dakota are continuing because of the name.

A major highlight of the year was RJR Tobacco's decision not to load at the end of 1989. This decision led to a significant decline in 1989 volume and market share for RJR. Volume declined by 27.8 billion units (15.7%) and market share by 3.3 share points. Although we have no information as to what the decline would have been without Reynolds' change in policy, business unit contribution from tobacco was up 5.2% compared to 1988, while it is estimated that it would have been increased by 27% had loading been continued. As might be predicted, RJR's market share will improve in 1990. For the twelve month period from October 1989 to October 1990, RJR had a market share of 29.6% compared to a 28.5% share in the calendar year 1989.

Despite these problems, RJR appears to remain financially sound. They have met their interest payments with few apparent problems, and have reduced debt on schedule

2026230145

through the sale of a number of companies primarily in the food area. The specific companies divested in the past twelve months are listed in Table 9. In addition they are continuing to pursue cost savings options in an aggressive manner. The last phase of the personnel cutbacks initiated in 1989 occurred on January 17, 1990, when RJR announced the layoff of 50 engineers and supervisors. That a significant reduction in force has actually occurred in Winston-Salem is apparently obvious to the town's citizens in that there have been complaints that RJR could donate their excess parking spaces in the downtown area to employees in the Wachovia and Phillips buildings.

On the other hand RJR continues to investigate every possible approach to reducing its costs. During 1990 weight reductions were made in thirteen additional brands. These reductions ranged from 2 to 8%. RJR is also putting considerable pressure on its suppliers to keep costs down. The number of brands which utilize 50% flax/wood pulp paper have been extended. In 1989 the only packings which had been affected were the price value brands Doral and Century. In the second quarter of 1990 all packings of Magna were changed over to 50% flax/50% wood pulp paper as well as two packings of Camel and six packings of Winston. In order to lower its enormous debt payment, RJR announced a refinancing program in July whereby corporate debentures due in 2007 and 2009 would be repurchased. These two debt issues are a particular thorn in RJR's side, since they carry the stipulation that the coupon rate must be adjusted in 1992 to bring the bonds back to par. Sources for the necessary capital include \$2.25 billion in new bank loans and additional \$1.7 billion in equity from KKR. The requisite bank loans were obtained with no problems in part because of generous fees being paid to several major banks by RJR. On the other hand, attempts by the major banks to "farm out" \$1.2 billion of the loan to smaller banks have resulted in the placement of only \$200 million at this time. In mid July the coupon rates of these two issues was increased from about 14% to about 17% increasing the trading price to about \$95 for \$100 face value. RJR has since bought back a large amount of the 2007 bonds. On Thursday, August 2, with the bond market in disarray as a consequence of the Iraq crisis, RJR bought back an estimated \$800 million to \$1 billion of the bonds at prices ranging from 90 cents to 95 cents on the dollar.

RJR has done an excellent job with the Tobaccoville facility. They have been able to reduce manufacturing costs as a consequence of increased efficiency and a decreased labor force. This increased efficiency has been accomplished without any loss in quality. In reality RJR has emphasized quality improvement during the past two years, and the substantial advantage PM enjoyed over RJR with respect to product quality has significantly narrowed.

Despite the many measures RJR Tobacco has taken to remain a strong factor in the US cigarette market, some financial experts think that further cost cutting measures must be

2026230146

Table 9

Companies Divested by RJR Nabisco since June, 1990

Chun King (remaining business) - Sold to Singapore consortium of Yeo Hiap Seng Ltd. and Fullerton Holdings Pte. Ltd., 6/89.

European food businesses (UK Nabisco Brands, Walker's Crisps, Smith's Crisps, Belin Group, Saiwa) - Sold to BSN Groupe, Paris, 6/89.

Associated Biscuits International (India, Pakistan) - Sold to Britannia Brands Pte. Ltd., 7/89.

Del Monte Corp., fresh fruit and vegetable operations including trademark - Sold to Polly Peck International, 8/89.

Del Monte Corp., canned food and processing operations - Sold to Citicorp, 9/89.

Baby Ruth, Butterfinger, Pearson candy businesses - Sold to Nestle, 10/89.

Hawaiian Punch - Sold to Proctor & Gamble, 1/90.

Nabisco food businesses in New Zealand, Singapore, Malaysia, Hong Kong - Sold to Britannia Brands Pte. Ltd., 3/90.

Brazil cigarette business - Sold to Dibrell Brothers, 3/90.

2026230147

taken in order for RJR to continue to meet debt repayment schedules. An article in Barron's (July 9, 1990) indicated that RJR must cut budgeted capital spending for 1990 by \$50 million. This article points out that further spending cuts may in turn result in further loss of market share resulting, eventually, in a downward spiral.

RJR Domestic New Product Introductions - Uptown, already mentioned above, was planned to be test marketed in Philadelphia in January, 1990. The product was to have been sold as two packings of menthol only - 80 mm box and 85 mm soft pack. Delivery targets were 17 mg tar, 1.2 mg nicotine, and 0.6 mg smoke menthol. One interesting feature of these cigarettes was that they were to have been packed with the filter end toward the bottom of the pack.

Salem Gold 85 cigarettes were introduced nationally in March, 1990. These cigarettes deliver 17 mg tar, 1.2 mg nicotine and 0.2 mg smoke menthol.

Dakota 80 (box) and Dakota Lights 80 (box) are being test marketed in Texas and Tennessee as of March, 1990. The Dakota cigarette delivers 17 mg tar and 1.1 mg nicotine, and the Dakota Lights cigarette delivers 12 mg tar and 0.9 mg nicotine. As already discussed this product is targeted toward young women.

Salem 80 (box) cigarettes were reintroduced in Chicago, Illinois, in May, 1990. This brand delivers 17 mg tar, 1.1 mg nicotine and 0.5 mg smoke menthol.

Horizon cigarettes (regular and menthol) have been test marketed in Georgia since June, 1990. This brand delivers 12 mg tar and 0.8 mg nicotine. This product uses a glycoside of ethylvanillin to modify the aroma of sidestream smoke. It is similar to Chelsea in that both products utilize the same flavor-release compound coated on cigarette paper. The differences are that Horizon is a full circumference cigarette whereas Chelsea is a slim cigarette (23 mm), and Horizon uses a 0.8% level of the flavor-release compound on the paper compared to 0.6% for Chelsea. It is worth mentioning that the flavor-release compound being used in these two products is apparently being produced by RJR's Avoca Division. To our knowledge RJR is the only tobacco company with captive facilities for the synthesis of tobacco flavors. The Avoca Division was originally established either in the late 1960's or early 1970's to grow clary sage as a source for scleral type terpene flavorants. We know that in 1980, Brian Lawrence, now Manager of Flavor Technology at RJR Tobacco R&D, was Director of Research and Development at Avoca. Recent information indicates that RJR still has 1000 acres devoted to the growth of clary sage and facilities to extract sclareol which is in turn converted to sclareolide. This facility is located in Pamlico Sound, NC. RJR has also started to grow experimental plots of low alkaloid tobacco via a standard breeding program at the same site.

RJR is actively continuing product development on their Premier product. We have discovered that they had been negotiating with groups within the German government in order to obtain approval to market Premier in Germany. It would appear, however, that RJR has no plans to market Premier in Germany in the near future.

RJR R&D Organization - During the previous two years the RJR Tobacco R&D staff has decreased by about 17%. In 1988, before the buy-out, the R&D staff was about 800 individuals. This number is now about 650-670. Most of those who were "let go" were early retirees (willing and unwilling), technicians and "low level performers." We are aware of four "high level" individuals who have either been terminated or have retired during this two year period. Don Roberts was Director of Brand R&D in 1988. He was replaced in this position by R. L. Willard in July, 1988, and terminated in August, 1989. Anthony Colucci, Director of the R&D Law Department, retired in 1988 and is now a consultant. Charles Nystrom, Manager of Scientific Affairs, was terminated in August, 1989. Lastly, Claude Teague, Director of R&D Administration, retired in 1988. A number of key scientists who have left include Jim Arnett, Senior Scientist in the agronomy group, Robert Moates, Scientist in the organic chemistry group, and K. W. White in the optical technology group. Dr. White, who was apparently the project leader of the optical technology group, resigned in 1989, but continues to consult for RJR.

Some recent information calls into question our estimates of RJR's R&D headcount. The estimate given above is derived from information contained in the "Directory of American Research and Technology, 1990." This information, however, is reported by RJR personnel. Another source indicates that RJR's headcount is 980. We are currently in the process of investigating this discrepancy.

RJR's R&D Organization has undergone some change from last year. F. H. Christopher, formerly executive vice president, Manufacturing and Technology, has recently retired. Bob DiMarco remains as Senior Vice President of R&D and now has five Vice Presidents reporting to him instead of four. The Biological R&D group has been split in two. One part retains the title Biological R&D, and A. W. Hayes continues as its Vice President. The second area is titled Toxicology R&D, and the Vice President is G. T. Burger. Biological R&D has four directorates - Biobehavioral Research, Environmental Tobacco Smoke, Sensory Evaluation and Smoking & Health - while Toxicology R&D has three directorates - Biochemistry/Microbiology, Pharmacology Research, and Toxicology Research. The remainder of the organization remains unchanged with M. E. Stowe as Vice President, Product and Applied Technology, R. A. Lloyd as Vice President, New Product Technologies, and W. M. Hildebolt as Vice President, Administrative and Technical Services. The RJR R&D Organization Chart is included as Appendix G. Along with the organizational chart is a complete list of every individual we have identified as being in RJR R&D. Some of these are not included in

2026230149

the organizational chart itself, either because they have since left RJR R&D, or because we do not know what group to place them in.

RJR Patents and Publications - During the twelve month period between June, 1989, and June, 1990, RJR Tobacco had 40 issued US patents, 2 German patents, and 4 European Patent Office (EPO) applications. This represents the largest number of patents for RJR for the four year period that we have been closely monitoring RJR's patents. These patents cover a wide range of topics as can be seen from inspection of Table 10. Several of these patents are of strategic importance. At the top of the list are two patents US 4,947,874 and US 4,947,875) which describe smoking articles which utilize electrical energy. Two German patents (DE 3,844,620 and DE 3,821,677) teach a system of applying flavor solutions to tobacco at the maker. The system described allows the flavor solution to be added to the center of the cigarette being formed. Two other patents deserve special mention because they clearly involve collaboration with other companies, despite the fact that RJR is the only assignee. US 4,870,748 describes an apparatus used to assemble the front end of the Premier article. All of the inventors are employees of Hauni. US 4,903,714 covers the mouthend piece of the Premier article. There are nine co-inventors, only two of which are from RJR. The remaining seven are from Kimberly-Clark.

As before, it is difficult to develop a picture of RJR's strategy from their patents. One possible conclusion is that the number of their patents will begin to decline in the coming years. The number of EPO applications is a good predictor of forthcoming US patents. Although this year RJR had the greatest number of patents in any year for the last four years, they also had the smallest number of EPO applications. Consequently, one would predict that their patent activity might begin to decline. Clearly RJR has a considerable interest in staking as large an area as possible in the "smokeless cigarette" domain. They continue to issue patents dealing with Premier, and they have four additional patents on true non-burning articles - two which use chemical heat sources and two which use electrical heat sources. They are trying to obtain as broad a coverage as possible with regard to use in that the first patent of each pair describes a smoking article, and the second patent describes a drug or flavor delivery device. The remainder of the patents cover such a wide assortment of topics, that no conclusions can be drawn.

The number of publications from RJR in 1989-1990 increased substantially from the previous year. In the period June, 1989, to June, 1990, 30 scientific publications appeared. If RJR's patents did not reveal any clear strategies, their publications do. Twenty-five of the 30 can be organized into five major areas; namely, toxicological papers relating to Premier (6), environmental tobacco smoke (6), analytical chemistry with particular emphasis on Fourier transform infra-red spectrophotometry (8), aerosol research including both aerosol physics and aerosol toxicology (3) and research in the

2026230150

Table 10

RJR Tobacco Patents from June, 1989, to June, 1990

Premier Related Patents	Non-Burning Article (Electrical)
US Patents - 5	US Patents - 2
EPO Publications - 1	
Tobacco Flavor Systems	Manufacturing Technology
US Patents - 2	US Patents - 3
EPO Publications - 2	German Patents - 2
QA Methods	Filter Additives
US Patents - 4	US Patents - 2
EPO Publications - 1	
Packaging	Smoking Machine
US Patents - 4	US Patents - 1
Tobacco Reclaiming	Controlled Profile Cigarette
US Patents - 1	US Patents - 1
Premier Manufacturing Equipment	Expanded Tobacco
US Patents - 2	US Patents - 1
Tobacco Extrusion	Reduced Protein Tobacco
US Patents - 1	US Patents - 1
Tobacco Casing	Cigarette Filters
US Patents - 1	US Patents - 2
Non-Burning Article (Chemical)	Tobacco Extenders
US Patents - 2	US Patents - 2
Dense Cigarette	Reduced Sidestream Cigarette
US Patents - 1	US Patents - 1

2026230151

chemical senses (2). The remaining five papers each address different areas of research; however, all five of them are either biochemical or toxicological in nature. In the competitive analysis section dealing with RJR in last year's (1990-1994) R&D Strategic Plan, it was mentioned that RJR was collaborating with a large number of outside research groups. This supposition has been amply confirmed by the 29 publications RJR has published in the preceding twelve months. RJR has published jointly with Battelle Research Center, Geneva, Switzerland; Veritas, Burlington, NC; Wake Forest University, Department of Chemistry, Winston-Salem, NC; Wake Forest University, Bowman Gray School of Medicine, Winston-Salem, NC; the University of Arkansas, Medical Sciences Hospital, Little Rock, AR; the University of Bern, Department of Obstetrics and Gynecology, Bern, Switzerland; the University of Colorado, Institute of Behavioral Genetics, Boulder, CO; Hazleton Labs, Kensington, MD; SRI Institute, Menlo Park, CA; Penn State University, Milton S. Hershey Medical Center; Hershey, PA; Battelle Memorial Institute; Pacific Northwest Labs, Richland, WA; the University of North Carolina, Chapel Hill, NC; and Louisiana State University, Biodynamics Institute, Baton Rouge, LA.

RJR R&D Strengths and Weaknesses - Despite cutbacks and morale problems, RJR Tobacco R&D continues to distinguish itself in a number of areas. The two areas of greatest strength continue to be its analytical chemistry group and its toxicology/biochemistry work. RJR R&D appears to have stepped up product development work in 1990; however, the department is clearly having problems in developing new products with a competitive advantage. There is no evidence that any further progress in a low sidestream product has been made. The fact (see above) that RJR is carrying out a tobacco breeding program to produce low-alkaloid tobacco plants would suggest at least some interest in a low nicotine product. However, there is little likelihood that such a product could be developed in less than four or five years due to the poor subjectives associated with low alkaloid tobaccos bred in this manner. Product development activities are continuing with distinctive flavors - particularly lemon - using molecular sieves as flavor-release vehicles. Most importantly, of course, considerable resources are being devoted to improving Premier. One weakness mentioned in previous years has been deleted this year. Although RJR Tobacco's work in physics cannot be said to be extremely broad, extensive work in aerosol research and the development of optical processing techniques suggests that it should not be regarded as a weakness. A list of strengths and weaknesses follows.

RJR R&D Strengths

- a. Analytical chemistry - RJR Tobacco R&D continues to demonstrate through publications high quality research in the area of state-of-the-art instrumental

2026230152

analysis. Particular emphasis has been placed on Fourier transform infra-red spectrophotometry.

- b. Toxicology/biochemistry - The extensive toxicology group which was put together to evaluate the Premier article is still essentially intact. Work has continued on "products which heat rather than burn tobacco," but has also moved into new areas. One such area is the development of an antibody-based analysis for methoprene.
- c. Electrophysiology - RJR's electrophysiology group continues to both publish and present work involving human response to flavors. Estimates are that their "biobehavioral research" group consists of between ten and 15 individuals.
- d. Environmental Tobacco Smoke - RJR has published a large number of papers in this area covering a number of different aspects of ETS. They would appear to have established a preeminent position in ETS research among domestic tobacco companies.
- e. Optical Inspection Devices - RJR has completed the installation of optical inspection devices in all of their packers. They estimate that these devices will allow them to reduce packaging-related defects by at least 75%. The devices in use were developed jointly by RJR Tobacco R&D and Videk, a subsidiary of Eastman Kodak. In addition RJR Tobacco R&D has a large group devoted to the development of new optical processing techniques.
- f. Process Development - Recent patents indicate that RJR is continuing to pursue novel process development techniques. As was mentioned above, the patents relating to the deposition of a flavorant in the center of a cigarette at the maker may be of considerable utility for specialized products.
- g. Extensive outside industrial contacts - RJR has apparently cut back on its collaborative research with universities. They continue to work closely, however, with a large number of suppliers including suppliers who have not traditionally been involved in the tobacco industry. Examples include collaboration with ImmunoSystems Incorporated to develop an antibody-based analysis for methoprene, Videk for the joint development of optical inspection systems, Union Carbide for the development of zeolites for flavor-release, and Integrated Separation Systems involving new techniques for two dimensional gel electrophoresis.

2026230153

RJR R&D Weaknesses

- a. Organic and inorganic chemistry - RJR Tobacco R&D continues to depend primarily on outside expertise for basic organic and inorganic chemical research.
- b. Materials Science - There is still no evidence that any research in this area is being carried out by RJR Tobacco. An RJR scientist attended an American Ceramic Society meeting last year. RJR appeared to be interested in novel materials for use in filters. However, there does not appear to be any individual on their staff with the requisite background to carry out this research, and no patents or publications have appeared to indicate that such research is ongoing.
- c. Paper technology - RJR continues to be completely dependent on its paper suppliers for the development of new cigarette papers.
- d. Natural product chemistry - For the first time in three years there was one publication dealing with natural product chemistry. There still appears to be a significant lack of activity in this important area.

BROWN AND WILLIAMSON

B&W Highlights - After considerable time and legal maneuvering Sir James Goldsmith abandoned all attempts to take over BAT Tobacco. Consequently, unlike RJR, B&W will remain a publicly owned company. BAT has done some restructuring during the previous year in order to make it more difficult for a hostile takeover to be pursued. They have defined their core businesses as tobacco and insurance. Since February, 1990, they have sold off eight businesses, including Saks Fifth Avenue and Marshall Field divisions, which no longer fit in with their core businesses. There has been some discussion that BAT will combine its laboratory in Hamburg with its Southampton facility; however, no action has been taken yet.

B&W Domestic New Product Introductions - Brown and Williamson has introduced no new product nationally and has test marketed only one new product domestically in 1990. Kool DeLuxe Lights 85 and 100 (box) and Kool DeLuxe Ultra Lights 85 and 100 (box) were test marketed in Hawaii in June, 1990. The Lights cigarettes deliver 10 mg tar, 0.9 mg nicotine and 0.5 mg menthol; the Ultra Lights cigarettes deliver 6 mg tar, 0.6 mg nicotine and 0.35 mg smoke menthol. These cigarettes have a 27 mm CA filter.

B&W R&D Organization - We have continued to expand our organizational chart for the B&W R&D Center. We now have identified 82 staff members by name and technical area. This represents about 1/4 of the total R&D staff and about 1/2 of the

2026230154

professional staff. The R&D Center is headed by J. S. Wigand, Vice President, Research and Development. Three Directors report to him - Andrew McMurtrie, Director of Product Development; Lance Reynolds, Director of Research; and the Director of Technical Services. Product Development is divided into six divisions, blend development, cigarette design, development center, filter development, international product development, and packaging; Research is divided into three divisions, analytical methods, microbiology, and new technologies; and Technical Services is divided into five divisions, cigarette intelligence, product evaluation, statistics, technical information, and technical project planning. The B&W organizational chart can be found in Appendix H.

BAT appears to be increasing its commitment to research both in the US and the UK. They are continuing to add staff to their Louisville Research Center. An advertisement appeared in Food Technology in March, 1990, for a flavor chemist. Southampton, which had significantly cut back its staff working in basic research, appears to now be reversing this trend. The laboratory was reorganized in April, 1990. A Fundamental Research Center has been established with Dr. R. R. Baker as its head. A BAT Technical Center was also established.

B&W Patents and Publications - Brown and Williamson increased its patenting activity slightly over the previous year, although the total number of BAT patents and patent applications declined. B&W received eleven US patents and one Canadian patent. BAT, UK had five issued US patents, two EPO applications and two UK applications. Lastly, BAT Cigaretten-fabriken GmbH had six issued US patents, five issued German patents, two EPO applications and one UK application. The totals are 22 issued US patents, 5 issued German patents, one issued Canadian patent, 4 EPO publications and 3 UK applications. All of the patents are broken down into the specific areas covered in Table 11.

A number of these patents deserve some discussion. US 4,911,184 from BAT, UK, covers low sidestream smoking articles. All of the claims (23) involve double-wrapped articles similar to Virginia Slims Superslims. However, the UK patent application on which this patent was based had no claims involving double-wrapped cigarettes. Apparently, before the US patent was allowed, B&W picked up some of our Superslims which had been submitted for outside panel testing. Since the teachings of the patent had two sentences mentioning double wrapped cigarettes, all of the claims were changed to cover that subject matter. Consequently, B&W has taken advantage of an earlier filing date than the PM patent application on Superslims to claim infringement.

US 4,898,191; 4,913,169; 4,917,121; 4,924,886; and EP 354,661(A) claim Premier type articles. None of these patents or applications contains any documentation suggesting

Table 11

BAT Patents from June, 1989, to June, 1990

Packaging	Smoking Articles
US Patents - 3	US Patents - 2
German Patents - 1	German Patents - 1
UK Applications - 2	UK Applications - 1
Premier Type Articles	Low Sidestream Cigarettes
US Patents - 4	US Patents - 2
EPO Applications - 1	EPO Applications - 1
Tobacco Expansion	Reconstituted Tobacco
US Patents - 2	US Patents - 1
Canadian Patents - 1	EPO Applications - 1
Manufacturing Equipment	QA Inspection Devices
US Patents - 2	US Patents - 2
German Patents - 3	
Non-Burning Article	Selective Filtration
US Patents - 1	EPO Applications - 1
Grooved Filters	
US Patents - 2	

2026230156

that the articles described have actually been made. In other words they are "concept patents." It is quite likely, based on our own experience, that the articles described would be quite difficult to make, and would probably not function as claimed without the development of new technology. Nevertheless, these patents establish a proprietary position for B&W in this area. One interesting feature of some of these patents is that B&W has addressed one of the customer complaints regarding Premier; that is, the failure of the Premier article to burn down like a cigarette. They have proposed a number of models where the heat source is an outer tobacco core which surrounds an air impermeable, temperature frangible wrapper which, in turn, surrounds a center core containing an aerosol generating material. The interface between the front end and the mouth end is designed so that the smoker cannot inhale any smoke from the burning tobacco. As the tobacco burns statically, it produces an ash which, in combination with the frangible wrapper and the spent aerosol generating material, can be flicked off the article.

European Patent Office Publication 346,648(A) describes a process for impregnating cigarette filter tow with di- or polycarboxylic acids or their anhydrides in order to increase filtration efficiency for basic smoke components such as nicotine. The only novel portion of this application is the use of anhydrides which are then hydrolyzed to the acids by storing the filters in a humid atmosphere. The use of acids on filters is an area which we are looking at rather carefully at this time.

Based on the patents BAT has published during the last year a number of strategies are evident. BAT Cigaretten-fabriken GmbH continues to produce patents in the areas of manufacturing technology and QA inspection devices. As was pointed out last year, BAT appears to be attempting to improve quality and to decrease cost through greater manufacturing efficiency. Clearly BAT has devoted considerable research resources to the development of articles which could compete with Premier. It does not appear that much in the way of product development resources have been devoted to this program, however. As pointed out above, however, they have established a proprietary position. Low sidestream products continue to be pursued, although the work that has been done is of little consequence. Lastly, BAT remains quite active in the area of packaging patents.

Once again, except for a few TCRC presentations, B&W had no publications.

B&W R&D Strengths and Weaknesses - Brown and Williamson's R&D Department is approximately half the size of the Philip Morris USA Research Center. As such they are less able to commit resources to the development of radical new products, such as ART or Premier, than is either Philip Morris or RJR. Although the combined total tobacco related R&D resources of BAT may be equivalent to PM USA, there is probably

2026230157

considerable overlap in areas of expertise which prevents full utilization of the resources. BAT tends to have considerable strength in the process development and engineering areas including the development of improved manufacturing equipment, QA inspection devices, and process modifications. Although they have been increasing their commitment to basic research, they seem to be weak in the application of this basic research to new product development. For example, they have done considerable work with low sidestream wrappers without really developing any new technology. They are opportunistic, however. They can continue to compete with companies which are larger than they are by rapidly analyzing new technologies from their competitors and changing them sufficiently to give them a proprietary position. As a consequence, to ensure the best possible competitive position with regard to B&W, it is necessary for PM USA to establish as strong a patent position as possible.

JAPAN TOBACCO INTERNATIONAL

JTI New Product Introductions - Beside King Size (soft pack) cigarettes were introduced to the Japanese market in October, 1989. This product delivers 10 mg tar and 1.0 mg nicotine and has a dual carbon in CA/CA filter.

Peace International 95 (box) cigarettes were introduced to the Japanese market in October, 1989. These cigarettes deliver 14 mg tar and 1.3 mg nicotine. Peace International has a single 25 mm CA filter and is packaged in a princess box.

With Class King Size (box) were introduced in December, 1989. This brand delivers 10 mg tar and 0.8 mg nicotine. The cigarette has a dual carbon in CA/CA filter.

Keith Slim Long Size (box) and Keith Mild King Size (box) little cigars were introduced in March, 1990. These little cigars are wrapped in a tobacco wrapper, similar in appearance to a reconstituted sheet. The wrapper contains small pieces of tobacco and measures 50-60 μ in thickness compared to Philip Morris' RL which is 150-160 μ thick. The wrapper contains both propylene glycol and glycerine as humectants, and has a Coresta porosity of about 2. These products deliver 20 mg tar and 1.5 mg nicotine with a puff count of about 14. Keith Slim Long Size has a 23 mm circumference and a single CA filter, while Keith Mild King Size has a 25 mm circumference and a dual carbon in CA/CA filter. Both products have filter ventilation. Keith little cigars were measured to have low visible sidestream which is a consequence of its high puff count and low wrapper porosity.

In April, 1990, Japan Tobacco introduced Select Special Lights King Size (soft pack) cigarettes. This brand delivers 10 mg tar and 0.9 mg nicotine. Select has a dual carbon in CA/CA filter.

Seven Stars Custom Lights King Size (box) cigarettes were introduced to the Japanese market in May, 1990. This brand has a dual carbon in CA/CA filter and delivers 10 mg tar and 0.9 mg nicotine.

JTI R&D Organization - Last year it was pointed out that Japan Tobacco has three R&D laboratories. Further research has shown that the number is 11. These laboratories are 1) Applied Plant Research Laboratory, 2) Tobacco Research Laboratory, 3) Tobacco Central Research Laboratory, 4) Pharmaceutical Research Laboratory, 5) Toxicological Research Laboratory, 6) Food Research Laboratory, 7) Life Sciences Laboratory, 8) Sea Water Combined Research Center, 9) Engineering Research Laboratory, 10) Plant Breeding and Research Laboratory, and 11) Product Development Center. Only the Tobacco Research Laboratory, the Tobacco Central Research Laboratory, the Process Development Research Laboratory and the Product Development Center are involved in cigarette related research and development. Consequently, it is difficult to compare our information on Japan Tobacco's R&D's budget, quoted at \$400 million, to PM USA's R&D budget.

During the last twelve months publications have originated from eight of these eleven R&D laboratories. The number of publications from each lab are: Applied Plant Research Laboratory, 3; Tobacco Research Laboratory, 7; Tobacco Central Research Laboratory, 1; Pharmaceutical Research Laboratory, 3; Toxicological Research Laboratory, 3; Life Sciences Laboratory, 22; Engineering Research Laboratory, 1; and Plant Breeding and Genetics Laboratory, 3.

It would be extremely difficult to construct an organization chart, as has been done for RJR and B&W, for any of the Japan Tobacco R&D laboratories for a number of reasons. Nor would it be particularly helpful to have such an organization chart. We have, however, determined the location and the head of each of their R&D labs, and this information is given in Table 12. Additional information on JTI, including the 1989 Annual Report and brochures from their key sciences and Tobacco Sciences Research Laboratories can be found in Appendix I.

JTI Patents and Publications - During the twelve month period between June, 1989, and June, 1990, Japan Tobacco had 22 issued US patents, 4 European Patent Office Publications, and 9 issued Japanese patents. The majority of these patents (60%) fit into two categories; namely, manufacturing equipment (11 US patents, 2 EPO publications, and 1 Japanese patent) and catalysts for carrying out organic reactions (7 US patents). The total breakdown of all 35 patents by subject matter is given in Table 13. One of the catalyst patents (US 4,845,065) is of special interest since it describes a material for the oxidation of carbon monoxide. The use for this catalyst would appear to be to reduce carbon monoxide in ETS as opposed to oxidation of carbon monoxide in mainstream

2026230159

Table 12

Japan Tobacco R&D Laboratories

Laboratory Name	Location	Laboratory Head
Applied Plant Research	Tochigi	Koye
Tobacco Research Laboratory	Tochigi	Nishinaka
Tobacco Central Research Laboratory	Yokohama	Maeda
Pharmaceutical Research Laboratory	Yokohama	Muriyama
Toxicological Research Laboratory	Hatano	Kubo
Food Research Laboratory	Yokohama	Kanaho
Life Sciences Laboratory	Yokohama	Kato
Sea Water Combined Research Center	Odahara	Mizusaki
Engineering Research Laboratory	Hiratsuka	Okada
Plant Breeding and Genetics Laboratory	Toyada	Tachimichi
Product Development Center	Tokyo	Saito

2026230160

Table 13

Japan Tobacco Patents from June, 1989 to June, 1990

Manufacturing Equipment

US Patents - 11

EPO Publications - 2

Japan Patents - 1

QA Inspection Devices

EPO Publications - 1

Japan Patents - 3

Filters

US Patents - 2

Tobacco Expansion

EPO Publications - 1

Tobacco Mothproofing Agent

Japan Patents - 1

Aroma Inhalation Article

Japan Patents - 1

Catalysts

US Patents - 7

Agricultural Equipment

US Patents - 1

Japan Patents - 1

Biotechnology

US Patents - 1

Tobacco Extract Deodorant

Japan Patents - 1

Tobacco Processing

Japan Patents - 1

2026230161

smoke. The patent states that the application is in removal of carbon monoxide from air, and the catalyst utilizes palladium and copper salts as the main ingredients. Two Japanese patents (Japan 01-151,460 and 01-151,505) exemplify one of Japan Tobacco's strategies; that is, the application of tobacco materials to other product areas. The first of these patents describes a tobacco extract deodorant, while the second covers tobacco extract as a mothproofing agent. The last patent of interest (Japan 01-191,674) teaches an aroma inhalation article which uses a chemical heat source to volatilize the aroma. This invention is quite similar to the packages now available in Japan which can provide heated Sake.

JTI continues to be involved in expanded tobacco. PM is currently in litigation with them regarding their alleged infringement of our DIET patents. The most likely scenario is that their activity will not have significant impact on our ET position. On the other hand, our activity will have little impact on their position.

As was the case in the previous twelve month period, Japan Tobacco's publications span a large number of basic research areas with primary concentration in "biotechnology." In the twelve month period between June, 1989, and June, 1990, 43 publications originated from eight of the eleven Japan Tobacco R&D laboratories. These publications can be categorized as: biochemistry, 10; toxicology, 8; organic chemistry, 7; catalysts, 6; tobacco chemistry, 5; entomology, 3; biophysics, 2; natural products chemistry, 1; and materials science, 1. The subject matter of these publications clearly are indicative of Japan Tobacco's long term strategy. They are doing considerable work in the area of developing improved plants (resistance to herbicides, insect resistance, etc.), particularly tobacco and rice. There are a significant number of publications describing toxicological studies relating to smoking and health issues. Considerable resources have been devoted to organic synthesis pertaining to two areas - new flavorant compounds and nucleosides to be used in Japan Tobacco's biochemical research. Of particular interest is extensive work with metal oxide catalyst systems which are primarily being used for the reduction or oxidation of organic compounds. It is not obvious as to where this work might be applied.

Japan Tobacco scientists do considerable collaborative work with scientists in university, government, and industrial laboratories. A partial list of collaborators includes Kitasato University, School of Hygienic Science; Kyoto University, Food Science Research Institute; Kyushu University, Institute of Genetic Resources and Plant Breeding Laboratory; Kinki University, Plant Nutrition Laboratory; Ministry of Agriculture, Forestry and Fisheries; Kyoto University, Wood Research Institute; Yuki Gosei Kogyo Ltd., Tokyo Research Laboratory; Mitsubishi Kasei Co., Toxicology Laboratory; National Institute of Hygienic Science, Biological Safety Laboratory; Itoham Food Inc., Toxicology Research Institute; Yamanouchi Pharmaceutical Co. Ltd., Product

2026230162

Development Laboratory; Institute of Environmental Toxicology; Daiichi Seiyaku Co. Ltd., Research Institute; Institute of Physical and Chemical Research; University of Tokyo, Department of Agricultural Chemistry; Food and Drug Safety Center, Hatano Research Institute; and Nippon Steel Corp. Ltd., R&D Laboratory.

JTI R&D Strengths and Weaknesses - Japan Tobacco appears to have established a course which is quite different from its worldwide competitors. Rather than diversifying through acquisition, they appear to be establishing new businesses through development of new technology and application of this technology to new areas. Although they continue to introduce new brands into the Japanese market (see above), they continue to lose market share to American companies, particularly Philip Morris, and almost appear to concede the Japanese market to the American companies in the long term. On the other hand they are aggressively pursuing the export of their products. The company announced in May, 1990, that their exports grew to 6.307 billion units, a 48% increase from 1988. Southeast Asian nations and territories, including Hong Kong, China and Singapore, accounted for 70% of the export volume. The Middle East followed with 20%. Japan Tobacco is also marketing their Mild Seven brand to Americans of Asian extraction. Although no figures are available, they appear to be having some success with this strategy on both the west and east coasts.

Japan Tobacco is also aggressively pursuing joint ventures with companies both in Japan and abroad to market their new products in the "biotechnology" area. The company recently formed an R&D partnership with Mycogen, an American biotechnology company, to jointly develop and commercialize bioherbicides worldwide. Japan Tobacco will receive 75% of the profits from sales in Japan, and 25% of the profits from sales in the United States. The two companies will share profits equally from sales in other parts of the world. Japan Tobacco has taken about a 3% equity position in Mycogen, and is funding research at the company at a rate of \$7 million over three years. Another recent announcement disclosed that Japan Tobacco has joined with three other major Japanese companies, Komatsu Ltd., Toshiba Corp. and Kajima Corp., to develop technology for automatic grafting of highly disease-resistant cabbages to boost productivity.

Japan Tobacco has extensive R&D facilities which span a large number of scientific disciplines. Their basic research is outstanding. If they appear to be less successful in the application of this basic research to new cigarette products, it is either because cigarettes are now of lower priority in their overall plan or possibly because their best people are working in other areas.

2026230163

OTHER TOBACCO COMPANIES

New Product Introductions-USA - The remaining three domestic tobacco companies have introduced new products either nationally or in test market. Lorillard has at last test marketed its first generic products. Harley Davidson 85 and Harley Davidson Lights 85 are in test market in Arkansas, while Heritage Lights 85 and 100 cigarettes are being test marketed in Louisville, Kentucky, Portland, Oregon, and Maine. The latter product has a \$4.00 off coupon attached to the carton.

The Liggett Group has established a third price tier. Pyramid Full Flavor 85 and 100 (regular and menthol) were introduced nationally. This subgenerically priced product utilizes wood pulp cigarette paper.

Response to the introduction of Pyramid was swift at both Philip Morris and American Tobacco. American introduced Montclair Lights 100 (regular and menthol), Montclair Full Flavor 100, and Montclair Ultra Lights 100 nationally at subgeneric prices to compete against both Pyramid and Bristol. As of the third quarter 1990, Pyramid had a 13% market share, while Montclair had a 0.7% market share during the same period. American has introduced two branded generic brands nationally; namely, American Lights 100 cigarettes and Malibu Ultra Lights 100 cigarettes. Lastly, American is test marketing Misty Lights 100 box (regular and menthol) cigarettes in both California and Louisiana. Interestingly, the cigarette will be priced as a full margin product in California, and as a branded generic in Louisiana.

New Product Introductions-Japan - Brown and Williamson, RJR, and American Tobacco have all introduced new products in Japan during the past twelve months. Brown and Williamson began exporting Barclay King Size (soft pack and box) cigarettes in December. This product has a dual carbon in CA/CA filter. The outer filter is typical of the domestic Barclay. These cigarettes were smoked using both the standard and modified cigarette holders. As expected, the smoke deliveries were higher when smoked with the modified holder.

RJR began exporting Vantage King Size (box) to Japan in January, 1990. This brand is similar in all characteristics to Vantage King Size (soft pack) which was introduced to Japan in March, 1989.

American Super Lights 100 (soft pack) cigarettes became available to Japanese consumers in November. This brand is exported to Japan by the American Tobacco Company. These cigarettes have a dual carbon in CA/CA and deliver 9 mg tar and 0.8 mg nicotine.

2026230164

Patents and Publications - The patents for the other tobacco companies are covered in the next section on Emerging Competitor Technology. American Tobacco and Liggett & Myers had no published papers from 1989 to August, 1990. Lorillard had two publications in that time period, one related to chemical synthesis of alkyl macroisocyclic ethers and the other related to ignition propensity and a cigarette ignitability index.

Emerging Competitor Technology

Earlier in this section, an in-depth review of patented technology developed by major tobacco companies including RJR, B&W/BAT and JTI was provided. Patents or published applications assigned to smaller cigarette manufacturers or other companies of interest were also reviewed to determine potential new technology trends that might be of interest. The table below lists US, European Patent Office (EPO) applications and British applications/patents for the past year for the companies noted.

<u>Company</u>	<u>US Patents</u>	<u>EPO Appl.</u>	<u>UK Appl.</u>	<u>German</u>	<u>Canadian</u>	<u>Japanese</u>
PM*	23	16	**	**	3	16
RJR	40	4	0/3	2	--	--
B&W/BAT	1/11	0/4	-	0/5	1/0	--
JTI	22	4	--	--	--	9
Gallaher	2	--	--			
Imperial	2	1	2			
Liggett	--	--	--			
Loew's Corp.	--	--	--			
Reemtsma	--	2	2			
Rothmans	3	3	--			

* PM USA and PM International

**UK and German designated through EPO

R&D subject matter experts were identified and requested to review all competitor patents and/or published applications. Documents of interest were selected for further, in-depth analysis. A brief synopsis of those selected, by technology category, is listed below.

Humidity Control in Cigarette Packages

Both Brown and Williamson and Kimberly-Clark filed US applications pertaining to humidity control in packaging in 1988, and corresponding applications have been

2026230165

published in the U.K. (2,222,816) and EPO (348,840), respectively. Both teach the use of saturated salt solutions to maintain the desired level of moisture equilibrium within the pack.

Tobacco Processing

A. Sheet Technology

BAT, in EPO published application 345,477, teaches a process for extrusion of round tobacco strands which are subsequently compressed to a narrow "ribbon" between 10 and 100 mm wide. Thereafter, the "ribbon" may be shredded for incorporation in a tobacco blend.

B. Expanded Tobacco

Both BAT (US Patent 4,844,101) and JTI (EPO 328,676) disclose improved apparatus for use in CO₂-type expansion processes. The apparatus improvement claimed by BAT comprises a cellular wheel tobacco material feeder and an expansion chamber integrated within the cellular wheel feeder. Steam consumption is said to be substantially reduced. The apparatus disclosed by JTI provides for a continuous expansion process using CO₂ whereby the material to be expanded can be continuously supplied to the impregnation vessel or discharged from it while the pressure within the vessel remains unchanged.

RJR was granted US Patent 4,922,932 for an improved expansion apparatus which minimizes release of impregnating or treatment medium into the atmosphere.

C. Flavor Technology

US Patent 4,898,188 granted to RJR discloses the extraction of tobacco flavor components via supercritical fluids from one type of tobacco and reapplication to another type while in the supercritical or subcritical state.

RJR, in US Patent 4,887,619, discloses an improved casing cylinder utilizing steam-fed nozzles for directing pressurized steam against the inner wall surface to prevent the accumulation of tobacco deposits on the cylinder walls.

2026230166

New Products

A. Combustible Smoking Products

US Patent 4,893,638 assigned to B&W discloses a cigarette, 10-19 mm in circumference and containing ground tobacco having a particle size of about 0.5 mm to 3.00 mm. The exposed end of the cigarette is coated with a polymeric material to prevent the fine particles from falling out.

Imperial Tobacco Limited was granted US Patent 4,881,555 which discloses a cigarette having a plug between the filter and tobacco rod. The plug is a heat sensitive aroma-release element which releases a pleasing aroma to the environment as the burning coal comes into contact with it. Apparently, the objective is not to flavor mainstream smoke, but to improve ashtray odor and possibly to avoid the odor of extinguished cigarettes.

BAT was granted US Patent 4,838,286 which discloses a conventional tobacco rod having a bore or passageway approximately three-fourths the length of the rod and in direct "gas flow communication" with a plug-space plug filter. The filter space is filled with menthol containing granules or other vapor-release materials. The article, on smoking, delivers substantially higher levels of menthol and a cooler smoke.

RJR was granted US Patent 4,920,990 which appears to be a combustible rod containing 40-85% tobacco and 15-60% of another smokable material comprised of inorganic materials, carbonaceous matter and binding agents. The nicotine content is greater than 2% based on dry weight of smokable material.

Brown & Williamson was granted US Patent 4,917,121 and a similar application, UK 2,224,921 was published. The UK application discloses a smoking article having a tobacco column and a rigid, gas-impermeable tube running the length of the column and in direct gas flow with the mouthpiece. The tube contains flavor release and aerosol generating material which is released by the heat of the burning tobacco. Tobacco smoke is blocked from entering the mouthpiece. The US Patent is identical except that the filter end is equipped with a cooling chamber, a tobacco plug and an additional cooling chamber. Aerosol and flavors pass through and pick up tobacco flavor from the plug on "smoking" the article.

2026230167

B. Non-Burning Articles

US Patent 4,913,168 assigned to RJR discloses the reaction of water with certain chemicals (metal oxide or an anhydrous metal sulfate) to generate heat and volatilize flavors in a non-burning article. Temperatures ranging between 70° and 200° C for 4-8 minutes are disclosed as a result of the chemical reaction in which the noted constituents are mixed.

Advanced Tobacco Products was granted US Patent 4,917,120 for a non-combustible substitute containing nicotine impact modifying agents which modulate the nicotine vapor by either quantity or physiological impact or both. Flavorless esters are claimed to be the preferred material for use.

US Patent 4,922,901 and EPO application 358,002 assigned to RJR disclose articles that utilize electrical energy to provide an aerosol. The EPO application discloses a reusable control unit which includes a puff-activated current switch, a time-based current regulator to control the heating element temperature and a battery. The 4,922,901 patent refers to a drug delivery device which employs an electrical power source. Both are essentially identical devices.

B&W was also granted US Patent 4,913,169 which discloses an article similar to others previously described with the exception that a heat conducting strip runs concentrically through a center tube and apparently enhances aerosol generation.

C. Nicotine Release Articles

AB Leo was granted US Patent 4,907,606 for an article which contains tobacco, sodium carbonate and flavoring agents. Tobacco is heated below the combustion temperature, but at a sufficient temperature to liberate nicotine when air is drawn through the article.

Schering Pharmaceutical has recently received a patent on a nicotine-release dermal patch which releases nicotine over a prolonged period of time.

Low Sidestream Products

In German Patentschrift (issued patent) 3,836,210, BAT discloses a coaxial cigarette which, on burning, leaves essentially no residual ash. The cigarette construction involves an inner rod or core surrounded by a wrapper and an outer core of tobacco. The inner wrapper may be paper or reconstituted tobacco with an air permeability less than 3 ISO units. The permeability of the outer wrapper is between 15-40 ISO units.

2026230168

The rod has a low-burn rate, reduced TPM, CO and nicotine per puff, and sidestream between puffs is reduced.

EPO applications 325,920 and 325,921 assigned to Reemtsma disclose a self-extinguishing cigarette and a low sidestream product respectively. Self-extinguishing features are achieved by the use of paper having along its length alternate zones of higher and lower permeability, obtained by compression or batonning of the paper in annular zones during its manufacture. The paper used to reduce sidestream is "batonned" by use of an embossing calendar mechanism. The compressed zones of the paper are ring-shaped, each being 0.1 - 0.8 mm long and the interval between zones is 0.1 - 5.0 mm.

US Patent 4,911,184 assigned to B&W describes a product less than 20 mm in circumference and wrapped in two discrete wrappers pretreated with sidestream reducing compounds. Compounds disclosed include the hydroxides of alumina, calcium, lithium and magnesium, or magnesium oxide. Alumina and Attapulgate clay are also disclosed. Sidestream reductions up to 30% are said to be achieved on smoking the double-wrapped cigarette.

RJR in US Patent 4,924,888 discloses a cigarette wrapped in paper containing inorganic oxide and/or hydroxide, and having an inherent permeability of less than about 30 CORESTA units and a net permeability of between 80 and 140 CORESTA units. Tobacco density in the rod is between 100 - 200 mg/cm³.

EPO application 357,359 assigned to BAT describes a reduced sidestream cigarette wrapper containing between 7 and 40% by weight of calcium sulfate dihydrate or calcium tartrate as a filler in the wrapper. The filler may also contain calcium carbonate, magnesium oxide or hydroxide, alumina or Attapulgate clay.

Flavors

US Patent 4,836,224 assigned to RJR discloses cigarettes having high nicotine content (i.e., greater than 2%) tobacco filler; the product is enhanced by the addition of organic acids, preferably levulinic acid in dissociated and/or nondissociated form. The additive is applied to the filler, filter, or both at levels greater than 1%, based on the dry weight of the filler.

2026230169

Filters

A. Filter Additives

EPO application 346,648 assigned to BAT describes the use of carboxylic acid additives to cigarette filter tow. Alternatively, the anhydride of the acid may be used. Filtration efficiency for basic smoke constituents such as nicotine is said to be increased.

In US Patent 4,861,324 assigned to JTI an improved apparatus and process are disclosed for depositing granular materials onto filter tow.

In US Patent 4,865,056, also assigned to JTI, there is disclosed an easily breakable capsule positioned near the filter end of the cigarette. The capsule contains water; on lighting, the smoker breaks the capsule to wet the filter, thereby providing a "soft" smoke with reduced smoke constituent delivery.

B. Filter Design

BAT received US Patent 4,874,004 which describes the coaxial filter construction for its previously described coaxial cigarette. The filter has up to four separate wrappers to accommodate its inner and outer cores.

UK application 2,217,971 assigned to Imperial Tobacco discloses a controlled profile filter having a conical smoke impermeable chamber extending axially into the plug. Slits in the chamber become occluded on smoking causing the path length of smoke through the filter to increase thereby causing a relatively constant TPM/puff throughout the smoking of the cigarette.

In EPO application 364,256 Rothmans describes a filter having a more uniform delivery profile. The filter comprises a cylindrical hollow tube with a disc with one or more openings. The disc, consisting of micro-fine fibers, is sealed to the inner surface of the tube.

UK application 2,212,707 assigned to BAT discloses cigarettes of conventional or smaller circumference having filters of differing circumference. A number of different construction drawings are provided to demonstrate the invention.

2026230170

Make/Pack

US Patent 4,899,765 assigned to RJR discloses high-speed makers having a tongue which is equipped such that water is continuously fed to the tobacco filler passing through the garniture region of the maker. Cigarettes of controlled density and firmness and having low amounts of hard spots, loose ends, etc. can be manufactured. The improvement is said to be especially beneficial for blends containing relatively high levels of expanded tobacco.

German Offenlegunschrift (published application) 3,844,620 assigned to Reynolds discloses application of flavorants at the maker at a point where the rod is half formed. The risk of spotting of the cigarette paper is said to be reduced.

Rothmans, in US Patent 4,896,681, discloses a method and apparatus for forming a rod containing two different blends of tobacco. Discrete "bunches" of one type tobacco are formed, and spaces between the "bunches" are filled with tobacco of a different blend by a variety of procedures. The process is said to produce rods with more uniform smoking characteristics.

BAT, in US Patent 4,865,051, discloses an apparatus for the continuous determination of two physical properties during the production of tobacco rods. The apparatus is designed to measure both hardness and RTD. Production problems can be identified immediately and corrected by means of an appropriate control.

Summary

During the plan year, tobacco-related patents and patents for non-tobacco articles and devices will be closely monitored and reviewed. Publications such as the weekly edition of the United States Patent and Trademark Office Gazette and the Tobacco Patents Bulletin (EPO and other European patents/applications) are reviewed on a continual basis, and selected abstracts of interest are published in the R&D Patent Update Bulletin. Careful analysis of documents of interest will be obtained and provided to management by the Patent Review Committee in conjunction with the Strategic Planning Committee.

Supplier Analysis

Flavor Suppliers - In 1985, R&D established agreements with flavor vendors to permit our receiving qualitative composite disclosures from the vendors for our compliance with Section 7 of the Labeling Act. In 1986 those agreements were amended to provide for quantitative data on selected ingredients as necessary. In December, 1986, at the Planning Meeting, it was decided that R&D will know and be responsible for each and

2026230171

every Philip Morris ingredient. Therefore, a program was begun to establish exact chemical specifications for each flavor. To facilitate this program, agreements were established with each vendor to provide for semi-quantitative disclosure of ingredients, by flavor, utilizing ranges <0.1%, 0.1-1.0%, 1.0-10.0%, and >10%. The specification program is in progress, and also includes the German Certification program. This effort ensures that all of the ingredients in the flavors and casing shipped are acceptable under German law. The net result is that our flavors and casings meet or exceed the strictest regulations in the world.

Filter Tow Suppliers - Celanese is continuing to work with Kimberly-Clark and Dexter to develop a CA Web product. As of November, 1990, an acceptable product has not been made. The subjectives are not exactly like CA, and the variability of resulting filter rods is high. Dexter is pursuing a different formulation. The current pricing and availability situation is very poor. Efforts on behalf of Celanese will probably diminish because of the cost of future mill runs. PM will continue to evaluate materials as they become available.

A menthol migration (stability) study was completed by Eastman. The results indicated that factors such as triacetin in the CA dope and filter preheat treatment do not improve menthol stability over triacetin applied conventionally. Eastman is continuing to pursue high efficiency tows and has agreed to provide us with 1/8" CA staple (to support PM web development efforts). Thus far, 300 lbs. have been supplied; however, they are seeking a long-term commitment from PM to improve their process and the product. Celanese was not willing to work with PM in this area. An Eastman patent involving spiral wound CA tow bands to form a cigarette filter was recently brought to our attention. Additional information is being sought. Currently, there are no PM programs ongoing at Rhodia. However, we are evaluating samples of supercrimp tow from them. Recently, a preliminary evaluation of Rhodia 2.1 dpf supercrimp tow was completed, and a weight savings over two control tow items, an increase in efficiency and more variability in RTD and weight was seen. A lower dpf supercrimp tow item (1.5) will be requested for evaluation.

A confidentiality agreement is being pursued with Courtaulds for work in the area of cellulose modification.

Packaging - Purchasing Technical Services (PTS) has instituted a vendor/supplier specification and review program to ensure that all inks, adhesives, coatings, and paper systems used in Philip Morris packaging, tipping and printed components comply with PM requirements for safety, subjective attributes and performance. These specifications are used for all domestic and some international printers. The requirements are based on

2026230172

manufacturing safety and performance, subjective taste and odor, and environmental (air, water, and solid waste disposal) issues.

Formula breakdowns for ink systems, coatings, board material, etc. are submitted to PTS by our vendors. PTS maintains a database on these materials and assigns test numbers. Actual physical samples are also received, when vendors cannot or do not wish to disclose formulations. The formulations and samples are sent to R&D Project 5001, Packaging Studies, which in-turn sends them to Analytical Research. The formulations are reviewed, and recommendations are made as to acceptability prior to use by our printers. Samples are submitted to the Materials Evaluation laboratory (or other appropriate analytical lab) for analysis. Recommendations for these samples are given based on the analytical results. The recommendations are made following PM guidelines which involve the toxicology of compounds, potential disposal problems, and employee safety. The results are reported back to Packaging Studies, who reports them back to PTS. If a product formulation has been approved by Analytical Research, it must still pass subjective testing (coordinated by Packaging Studies) and finally machinability before it is qualified for use. In 1989, Analytical Research received over 100 formulations and samples for review; to date this year over 70 samples have been received. PTS received over 750 formulations for consideration in 1989.

Another aspect of packaging which is monitored is residual solvents which remain after printing. PTS, in conjunction with Packaging Studies, has developed a list of solvents which cannot be used and threshold limits for others. The solvents are monitored on finished packaging using headspace GC. Incoming QA monitors all new brands and selected production brands. Project 6505, Special Investigations, analyzes new formulations before they reach production, and also provides identification of unknowns in new formulations and those found in production runs.

The most recent testing of packaging material has been for the determination of four heavy metals that were designated by the Conference of Northeastern Governors legislation. A procedure was developed by Project 1759 which uses Energy Dispersive X-ray Fluorescence (EDXRF) to screen packaging for the selected elements. This is not a quantitative procedure, but one which can establish that the levels in the material are below the 600 ppm stated by the legislation. Investigations are continuing to develop a suitable method for accurate quantitation. For the EDXRF method, samples are taken from the component (i.e. a label) such that a sample representing each ink color used is analyzed. For example, samples for a Marlboro label would consist of a red, black, white and the crest areas. Screening of current production will be done by brand family. To date only Marlboro "Red Roof" components have been completed. New brands will be screened as they are received. The samples are collected by Incoming QA.

2026230173

Paper Suppliers - During 1990 we have continued working with Kimberly-Clark (KC) to develop cigarette papers for reduced sidestream cigarette designs. Much of the work has involved a high basis weight (63 g/m^2) calcium carbonate paper. Paper properties such as calcium carbonate level, type and concentration of sizing agent, and permeability have been explored on base sheets made in KC's mill and sized either on their laboratory coater or on ours. We have also received variations of the Superslims outer wrap paper (45 g/m^2) from KC for evaluation as a single wrap on low sidestream cigarette models. Flavor-release coatings have been coated on both conventional wrappers and on the low sidestream wrappers listed above for evaluation on cigarette models.

Low sidestream wrapper development work has been conducted with Ecusta in search of a magnesium filler that can yield low sidestream delivery with acceptable taste characteristics. Progress has been made toward identifying processing requirements for a mined magnesium carbonate material for a mill trial at Ecusta. Ecusta has continued to supply samples of magnesium hydroxide papers for our evaluation.

Programs to develop reduced cost cigarette papers based on wood pulp are being conducted with KC and Ecusta. European suppliers such as Papeteries de Mauduit and Wattens have submitted wood pulp papers as well.

Adhesives - There are four major suppliers of cigarette construction and packaging adhesives-- National, Fuller, Findley and Ajax. Collaboration with adhesive suppliers was begun in 1989, and PM has signed a confidentiality agreement with National Starch and intends to initiate work on setting detailed adhesive specifications. In conjunction with National, a sideseam adhesive has been developed which contains a flavor-release compound for Project Ambrosia. Collaborative programs are likely to continue with adhesive suppliers as heavy basis weight papers are developed and we strive for commercial maker speeds with these papers. We anticipate adhesive problems for sideseam and tipping with the heavy basis weight papers. Adhesive development will be required to address these issues.

Vision Systems - The machine vision industry has undergone a shakeout during the 80's. The number of machine vision companies has been reduced from a peak of approximately 200 to a half dozen or so major players. There is still no standard in hardware, and each of these companies offers an advantage over the others in a particular application. PM Engineering has worked closely with Itran for pack inspection, Pattern Processing Technologies for cigarette inspection and Allen-Bradley for the inspection of tipping paper.

2026230174

R&D has recently developed a proprietary inspection procedure which allows global inspection of packs while minimizing the specialized skill required for setup and use. An effort is currently underway to negotiate an agreement with Itran to manufacture the system. The preferred hardware is the Fs-11 hardware under development by Itran.

Each of the inspection problems under consideration within PM has unique requirements that cannot presently be addressed by hardware supplied by a single manufacturer. It is anticipated that additional relationships will need to be formed.

Near Infrared Monitors - Near infrared (NIR) process monitors are in use in the tobacco industry for moisture measurements. However, the devices in use are for the most part "dumb" sensors, that is, they are set to measure radiation reflected from the samples at one or at most a few wavelengths. Currently, instruments with scanning systems with fiber optic options collect the entire practical NIR spectrum. Only development of application methods and software will permit adaptation of off-the-shelf hardware to process analysis for a variety of processing materials, additives, casings, etc., and possibly to blend discrimination. Innovative application of new concepts such as fuzzy logic software will reduce calibration requirements and enhance process control application.

Tobacco Seed - Northrup King (NK) has withdrawn from tobacco seed research and development, in part, because U.S. law prohibits commercial export of U.S. tobacco seed (i.e., limiting sales). Short-term, R&D and Leaf feel this does not pose a serious problem since NK will continue to sell their current stock and meet industry requirements. Long-term, if the U.S. law is not changed, tobacco seed R&D will fall on land grant universities. Some of these universities are under pressure to change their roles in this area due to anti-smoking campaigns and a lack of skilled researchers with an interest in tobacco. Future varietal development may require the establishment of a separate organization(s) to assist the universities.

Social and Political Influences

Social and political factors continue to be the greatest challenge to the industry. The major concern in this area is the anti-smoking movement and its impact on state and federal legislative activity. The results are evident in proposed legislation in the areas of smoking restrictions, advertising restrictions and sampling restrictions. Legislation relating to "fire-safe" cigarettes passed this year at the federal level and action is anticipated on the ingredient issue.

Another attack on the industry is the increasing state cigarette taxes and proposed increase in the Federal Excise Tax. As state governments and the federal government

look for ways to increase revenue, cigarette taxes are one of the first to be proposed. These tax increases have an impact on the cigarette industry, and these factors are discussed later in the Future Factors Section.

The current emphasis of the anti-smoking movement, in addition to legislative activity, appears to be focused on environmental tobacco smoke and the non-smoker as well as the social costs of smoking. This activity is developing a changing social environment for the consumer, which the industry is responding to in the form of new products. These trends are anticipated to continue, and the next five years will be among the most challenging the industry has faced on the social and political fronts.

Perceived health concerns remain a major component of the anti-smoking movement. However, product liability, while still a threat, has not proven a profitable endeavor for the plaintiffs in these cases. Close monitoring of the scientific and legal status related to these concerns is essential.

External Analysis Summary

External threats and opportunities that arose from our external analysis summary are summarized below. Additional discussion on the future scenarios involving most of these current threats and opportunities is included in the section on Future Factors.

Opportunities

A number of market opportunities can be identified from the External Analysis Section. These include: a product "perceived" as being "safer" by the consumer, international market growth, menthol products, increase in market segments, proprietary processes and products, environmental smoke abatement-design and specifications, reduced ignition propensity product, and a non-conventional cigarette.

Threats

Threats developed from the External Analysis Section include: pressure to increase taxation, government regulation of cigarette construction (ignition propensity), government regulation of ingredients, social unacceptability, foreign competition, product liability, novel product development, margin erosion due to strength of price/value category, smoking and health issues, limitation or ban on advertising, potential product tampering, and government attack on nicotine.

2026230176

Analysis of Future
Factors

2026230177

E. ANALYSIS OF FUTURE FACTORS

MARKETPLACE FACTORS

COMPETITIVE PRESSURES - DOMESTIC

Status:

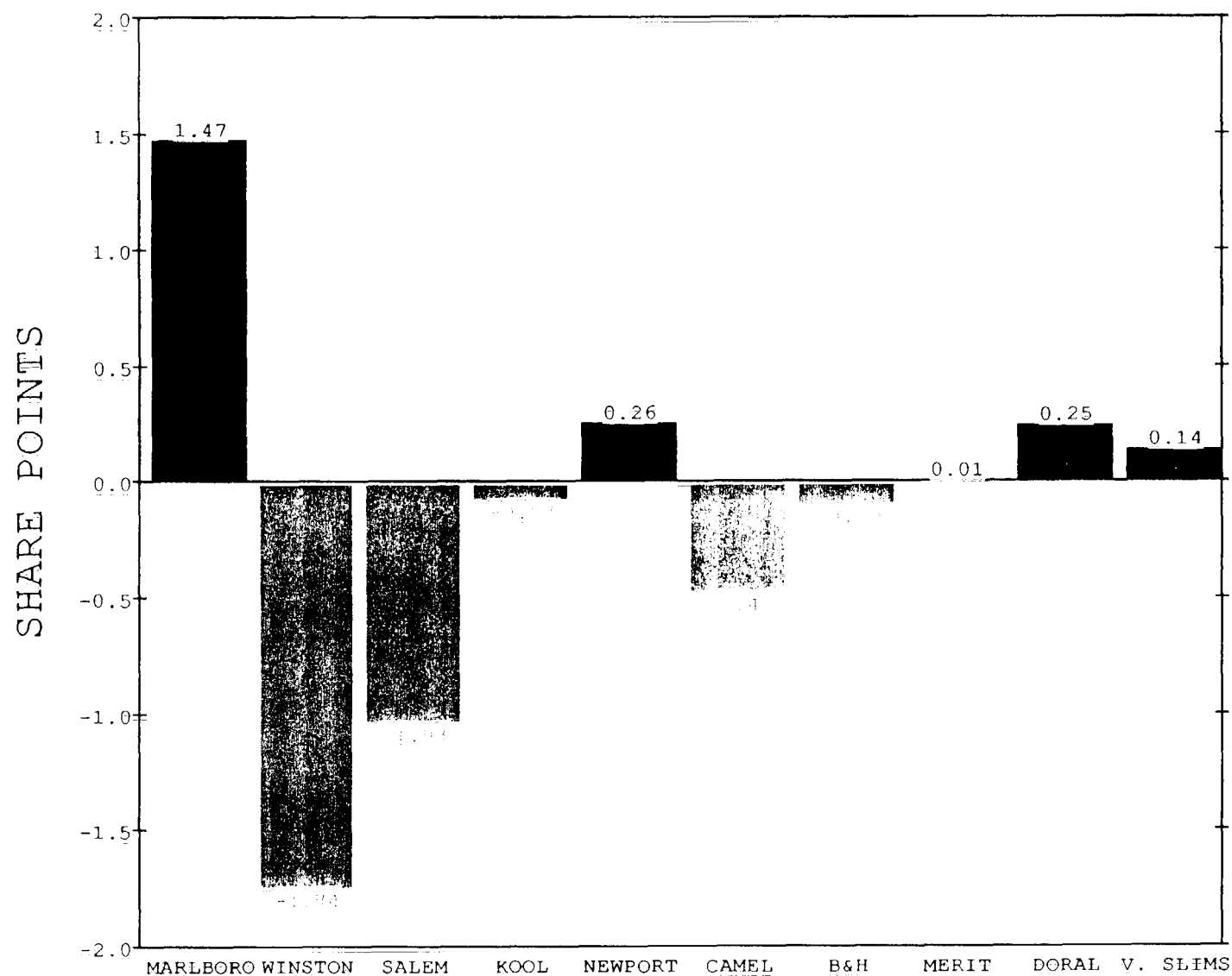
Sales - The data presented for 1989 is distorted due to the fact that RJR realigned year end inventory. This fact is evident in both their 1989 volume and Market Share data.

<u>RJR Volume *</u>		<u>% Change</u>
<u>1988</u>	<u>1989</u>	
177.21	149.43	- 15.7
<u>RJR Market Share</u>		<u>% Change</u>
<u>1988</u>	<u>1989</u>	
31.8%	28.5%	- 3.3

* Billion Units

In addition to this trend noted for RJR, total industry volume showed a decline of 6.1% to 523.88 billion units from 558.12 billion units in 1988 (sales data obtained represents Maxwell Report Year End Estimates). It is anticipated that industry volume should be relatively flat for 1990. PM USA's accomplishments during 1989 are even more dramatic when one considers RJR's artificially depressed 1989 figures. PM achieved volume growth in 1989 to 219.5 billion units from 219.3 billion units in 1988. This volume growth was accompanied by a Market Share growth of 2.6% for a total of 41.9% of the U.S. cigarette market. The only other company to demonstrate both volume and share growth was Liggett from 15.7 billion units in 1988 to 17.0 billion units in 1989 and a share growth of 0.4% to 3.3%. This is the first growth for Liggett since 1984. While experiencing a volume decline, Brown & Williamson increased share by 0.5% to 11.4% of the market. American Brands maintained a 7.0% share of the market for 1989. The top ten brands (Figure 6) held similar standings to last year. Of the brands showing share growth, Marlboro advanced 1.5 share points, Newport, Doral and Virginia Slims improved in share, and Merit remained the same. Winston, Salem, and Camel suffered significant losses in share, some of which is due to RJR's no load decision.

Figure 6
 TOP TEN BRANDS
 SHARE CHANGE: 1989 VS 1988



6210329202

BRAND

New Products - A total of 68 new packings were introduced into the market place in 1989. All of the new product introductions/test markets from January 1989 through May 1990 are listed in Table 14. Of these, 39 packings were introduced into the price value category. Most noteworthy was Liggett's introduction of Pyramid, which opened the sub-generic category. This category was soon expanded with American's Montclair and PM's introduction of Bristol. RJR was active with the introduction of Vantage Excel 100's. This product featured a cigarette paper containing magnesium hydroxide, which reduces visible sidestream smoke. The advertising claimed "less smoke from the lit end." The product was withdrawn from test market. RJR later introduced into test market Chelsea 100's Box (plain and menthol). This product utilizes ethylvanillyl-glucoside in the cigarette paper. The advertising claimed "this cigarettes has smoke that smells good." This test market was maintained, and the full circumference product Horizon was later introduced with the same odor feature. Lorillard introduced Spring Lemon Lights 85's and 100's (Regular & Menthol). The flavor source in these cigarettes is citral. PM introduced Virginia Slims Superslims 100's Box nationally. This product has a 17mm circumference and features low visible sidestream smoke. PM also launched into test market Next De-Nic and Merit De-Nic. These test markets are PM's first introductions of products developed in the ART program.

The new product activity is an indication of the growth of the price value segment, with 57% of new product activity in this segment. In total 14.9% of the U.S. cigarette market is represented in this price value category. This is a share growth of 3.4%. RJR remains the leader with a share of 31.8% of this category. RJR's Doral leads with a 1989 volume of 19.03 billion. Brown and Williamson's share was 23.3% with a growth of 2.9%, and, PM had 23.2% share with a growth of 2.2%. The source of growth is in the branded generics subcategory. The brands Doral, Cambridge and Richland grew, and new entries Viceroy, Alpine and Magna expanded the branded generics.

Social Acceptability - Domestic competition is not limited to the other tobacco companies. Smokers quitting smoking through a variety of cessation programs is a big factor in the market decline. Non-tobacco companies could enter the market place with a Premier type of product or another device to substitute for smoking. Our new product programs need to be structured to develop products which satisfy consumer needs. The social environment of our consumers is changing and new products need to be developed to fit into these social trends.

Likely Scenario:

Sales - Industry sales are likely to decline at a rate of about 3% per year. Due to RJR's no-load action in 1989 and the resulting distortion in 1989 sales, 1990 sales volume figures are likely to be affected in a reverse manner, since RJR product normally sold in

Table 14

New Product Introductions/Test Markets

January, 1989

PM	Alpine 80; Alpine Lights 80 (Box)
RJR	More White Lights 120 (Plain & Menthol)
RJR	Vantage Excel 100
RJR	Best Value Full Flavor
	Filter Lights
	Filter Lights Menthol
	Ultra Lights 100
B&W	Kool Ultra Lights
B&W	Kool Lights
Liggett	Pyramid
Liggett	Pyramid Ultra Lights
Liggett	Pyramid Lights Menthol

March, 1989

RJR	Chelsea 100 (Plain & Menthol)
RJR	Doral FF Menthol
B&W	Belair Lights (85 and 100)

July, 1989

PM	Next Ultra Low Tar & Low Tar 85 & 100
PM	Next Ultra Low Tar & Low Tar Menthol 85 & 100
PM	Merit De-Nic® Ultra Low Tar & Low Tar 85 (Plain & Menthol)

2026230181

Table 14 (continued)

New Product Introductions/Test Markets

May, 1989

PM	Marlboro Ultra Lights 85 & 100 (Box)
RJR	Doral Ultra Lights 85
RJR	Magna Lites 80
American	American Filters (85 & 100)
Lorillard	Spring Lemon Lights 85 & 100 (Plain & Menthol)

September, 1989

PM	Virginia Slims SuperSlims 100 Box (Plain & Menthol)
PM	Cartier 100 10's & 20's (Plain & Menthol)
Liggett	Pyramid FF (85 & 100)
Liggett	Pyramid FF Menthol (85 & 100)
American	Misty Lights 100 Box (Plain & Menthol)
American	Malibu Lights 100

November, 1989

American	Montclair Lights 100 (Plain & Menthol)
American	American Lights 100 Menthol
Lorillard	Harley Davidson 85
Lorillard	Harley Davidson Lights 85

2026230182

Table 14 (continued)

New Product Introductions/Test Markets

January, 1990

PM	Bristol Lights 85 (Plain & Menthol)
PM	Bristol Lights 100 (Plain & Menthol)
PM	Bucks FF 85, Bucks Lights 85
RJR	Uptown 80 & 85 Menthol

March, 1990

RJR	Dakota 80, Dakota Lights 80
RJR	Salem Gold 85
Lorillard	Heritage Lights 85 & 100

May, 1990

PM	Bristol FF 85 & 100
PM	Bristol Ultra Lights 100 & 85 (NF)
PM	Next De-Nic® 85 & 100 (Plain & Menthol)
RJR	Horizon 100 (Plain & Menthol)
RJR	Salem 80 (Box)
American	Pall Mall 100

2026230183

1989 was pushed into 1990. This may result in 1990 industry sales being higher than predicted, and PM market share being lower than predicted.

New Products - Brand proliferation is expected to continue since, in the tobacco industry, even products with a relatively small market share can be profitable.

Social Acceptability - RJR has test marketed three products in the past eighteen months that address the social concerns of consumers. Vantage Excel 100 lowered the visibility of sidestream smoke, and Chelsea and Horizon altered the aroma of sidestream smoke. PM launched Virginia Slims Superslims which provided reduced sidestream smoke visibility. New products which address concerns of consumers provide an opportunity to gain additional market share. Several R&D programs are committed to implementing technologies into new products. Technologies which offer advantages to the consumer should be developed into acceptable cigarette products to give us an advantage in the market place.

R&D Programs:

- Menthol
- Project Ambrosia
- Low Tar/High Flavor (Project BOLD)
- Filtration Research
- Paper Technology/Reduced Sidestream
- Domestic Product Support
- Project Beta
- Project ART

COMPETITIVE PRESSURES - FOREIGN

Status:

Philip Morris 1989 US export sales increased 13.4% over 1988 sales. Production forecasts for 1990 predict an increase of approximately 32% over 1989. As the domestic market continues to decline, these export market opportunities must be pursued aggressively to maintain production volumes.

Foreign cigarette manufacturers continue to provide Philip Morris with competitive challenges. JTI continues to dominate the Japanese market with an 85.1% share. JTI is countering foreign competition aggressively by introducing upscale new brands, sponsoring campaigns for young urbanites and increasing vending machine exposure. They introduced nine new brands to the marketplace in 1989. This heavy emphasis on

new brand introduction (Table 15) is continuing in 1990, along with extensive promotion of Mild Seven, the dominant brand family in Japan. Tekel dominates in Turkey with a market share of 85.1%. In Taiwan, the Taiwan Tobacco and Wine Monopoly holds an 85.6% market share. The top seven brands in Korea are produced by Korean Tobacco & Ginseng which has a market share of 96.2%. PM brand family market performance is shown in Table 16.

Likely Scenario:

Philip Morris US export production is predicted to continue increasing during the next five years, with a compounded annual growth rate of 5.3% overall. The most growth is expected in the Asian markets. Yugoslavia and the USSR are also expected to be major export markets during the next five years. Other US tobacco companies will exert competitive pressure on Philip Morris as they strive to increase market share in other countries in order to maintain the viability of their US operations. Proactive product development and aggressive pursuit of market opportunities will be required to achieve international market share growth. Additional Asian countries, such as Thailand, will provide new market opportunities.

Import segments will continue to grow in the Asian markets. Production forecasts indicate that PM exports to the Asian markets and Saudi Arabia are expected to increase through 1995 (Table 17). Exports to Yugoslavia and the USSR are expected to increase sharply through 1991 and then stabilize. Exports to Kuwait are expected to resume in 1991. Current events in Kuwait are unpredictable as is their potential impact overall on these forecasts. Exports to Turkey are expected to increase through 1992 and then begin declining. As the import segments grow, local manufacturers will provide increased competitive pressure as they try to maintain the high market shares which they currently hold. Aggressive, innovative product development and promotion can be expected.

PM export performance in specific international markets is provided in Tables 18 and 19. PM's share of these markets is increasing with the exception of Saudi Arabia. PM has a significant portion of the markets in Saudi Arabia, Hong Kong. However, due to increasing import competition in many of these countries, PM's share of the import market is generally decreasing with the exception of Taiwan.

Table 20 offers an analysis of current worldwide, international and domestic market trends for both PM and the industry. Both the volume and rate of growth of the international market offer some clear opportunities. In addition, the quality and availability of domestic leaf can sometimes provide a clear product advantage to a US company in the international market.

Table 15

New Product Introductions - 1989

Japan:

Merit Lights KS SP - Philip Morris
Merit Lights KS Box - Philip Morris
Lark KS Box - Philip Morris
Lark Super Lights - Philip Morris
L&M Milds KS Box - Philip Morris
Parliament Lights 100 Box - Philip Morris
Parliament KS Box - Philip Morris
Vantage KS SP - R.J. Reynolds
Camel Lights KS Box - R.J. Reynolds
London Lights KS Box - The London Tobacco Co.
Ducal Menthol KS Box - The London Tobacco Co.
Marlboro KS Box - JTI
Marlboro Lights KS Box - JTI
Mild Seven Super Lights 85 SP - JTI
Claris Lights Menthol KS SP - JTI
Sometime Lights KS Menthol Box - JTI
Cabin Mild KS Box - JTI
Cabin Super Mild KS SP - JTI
Epique 100 Menthol Superslims - JTI
Beside KS SP - JTI
Peace International 95 Box - JTI
With Class KS Box - JTI
Lucky Strike Milds KS SP - Brown and Williamson
Kent Deluxe Milds 100 Box - Brown and Williamson
Barclay KS SP - Brown and Williamson
Barclay KS Box - Brown and Williamson
Gitanes Lights KS SP - S.E.I.T.A.
Parisienne Mild KS Box - F.J. Burrus
Pierre Cardin Lights Box - F.J. Burrus
Craven "A" 100 Box - The House of Craven
Craven "A" 100 Super Mild Box - The House of Craven
Vogue 100 Box Superslims - American Cigarette Co. Ltd.
Vogue Menthol 100 Box Superslims - American Cigarette Co. Ltd.
Peter Stuyvesant KS SP - American Cigarette Co. Ltd.

2026230186

Table 15 (continued)

New Product Introductions - 1989

Japan:

American Super Lights 100 SP - The American Tobacco Co.
Maryland KS SP - C.I.T. Monte Paz S.A.
Ark Royal KS SP - C.I.T. Monte Paz S.A.
San Chl KS SP - Yuxi Cigarette Factory, China
Shiwn KS SP - Kuming Cigarette Factory, China

Turkey:

Tekel 2000 - Tekel

Hong Kong:

Marlboro Lights Menthol Box - Philip Morris

Taiwan:

Virginia Slims Lights - Philip Morris
Virginia Slims Lights Menthol - Philip Morris

Korea:

Mt. Halla - Korean Tobacco & Ginseng
Lilac - Korean Tobacco & Ginseng
Virginia Slims Lights - Philip Morris
Finesse
Cartier

2026230187

Table 16

**Philip Morris U.S. Exports
Brand Family Market Performance**

Market Share Direction by Brand Family

	<u>Marlboro</u>	<u>Lark</u>	<u>Philip Morris</u>	<u>Parliament</u>	<u>Visa</u>	<u>Virginia Slims</u>	<u>Merit</u>
Japan	N.A.	(+)	Stable	(+)	N.A.	(+)	N.A.
Turkey (Domestic)	(+)	N.A.	N.A.	(+)	N.A.	N.A.	N.A.
Saudi Arabia	(-)	N.A.	N.A.	N.A.	(-)	N.A.	N.A.
Hong Kong	(+)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Taiwan (Import Mkt)	(-)	(-)	N.A.	(+)	N.A.	N.A.	N.A.
Korea (Import Mkt)	(+)	(+)	N.A.	(+)	N.A.	N.A.	N.A.

2026230188

Table 17

**Philip Morris U.S. Exports
(Billion Cigarettes)**

	Actual Sales		Production Forecast			C.A.G.*			
	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1990-1995</u>
Total Export	68.8	78.0	103.3	112.2	121.5	125.6	130.3	133.9	5.3%
Major Markets:									
Japan	20.6	26.5	33.1	37.0	40.7	44.8	49.3	54.2	10.3%
Turkey (Domestic)	8.6	10.2	13.9	16.7	17.3	15.1	13.1	9.5	-7.3%
Saudi Arabia	4.2	4.5	5.3	5.3	5.5	5.6	5.7	5.7	1.7%
Hong Kong	2.7	2.8	3.2	3.3	3.4	3.6	3.7	3.9	4.4%
Taiwan	3.4	2.4	2.9	3.4	3.4	3.5	3.6	3.7	4.9%
Yugoslavia	0.6	0.7	2.4	3.9	3.9	3.9	4.0	4.0	10.7%
Kuwait	1.2	1.4	0.9	0.0	1.6	1.6	1.6	1.7	13.0%
Korea	0.5	1.1	1.5	2.2	2.4	2.7	2.9	3.1	15.5%
Other Levant (USSR)	0.1	0.1	2.4	3.4	3.4	3.5	3.5	3.5	8.0%

*Compounded Annual Growth

2026230189

Table 18

Philip Morris U.S. Exports
Market Share (%)

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>C.A.G.*</u> <u>1987-1989</u>
Japan	1.5	1.7	2.6	5.2	6.8	8.4	+27.1%
Turkey (Domestic)	1.3	4.5	9.4	13.3	12.3	13.7	+1.5%
Saudi Arabia	35.4	35.7	36.7	39.7	38.9	38.3	-1.8%
Hong Kong	25.9	29.4	33.0	36.0	36.8	37.6	+2.2%
Taiwan	0.2	0.2	0.2	8.2	9.5	8.6	+2.4%
Korea	-	-	0.02	0.06	0.6	1.1	+3.3%

*Compounded Annual Growth

0610829202

Table 19
Philip Morris U.S. Exports
Share of Import Markets (%)

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>C.A.G.*</u> <u>1987-1989</u>
Japan	74.8	74.4	74.7	62.0	58.5	59.0	-2.4%
Turkey (Domestic)	51.8	73.3	86.5	88.6	85.8	86.0	-1.5%
Saudi Arabia	35.4	35.7	36.7	39.7	38.9	38.3	-1.8%
Hong Kong	41.4	52.4	55.8	67.2	65.5	63.9	-2.5%
Taiwan	14.2	13.6	12.2	49.8	59.3	59.9	+9.7%
Korea	-	-	35.0	31.2	37.2	30.2	-1.6%

*Compounded Annual Growth

1610829202

Table 20

**Worldwide, International and Domestic
Market Trends* (in billions)**

<u>Industry</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Compounded Annual Growth Rate 1986 - 1989</u>
Total Worldwide	4,975.0	5,118.0	5,200.0	5,350.0	+2.4%
Total International	4,391.5	4,547.0	4,642.2	4,826.1	+3.2%
Total Domestic	583.5	571.0	557.8	523.9	-3.5%
<u>Philip Morris</u>					
PM Worldwide	506.8	540.8	556.4	582.4	+4.7%
Market Share	10.2%	10.6%	10.7%	10.9%	
PM International	292.3	325.2	337.1	362.9	+7.4%
Market Share	6.7%	7.2%	7.3%	7.5%	
PM Domestic	214.6	215.6	219.3	219.5	+0.75%
Market Share	36.8%	37.8%	39.3%	41.9%	

*Figures include cigarettes designated for the military.

2026230192

Opportunities exist in the menthol markets of Japan, Hong Kong and Taiwan, with Salem as the driving competitive force. The major Asian markets all offer product opportunities in the low tar segments as smokers trade down to these brand types. The Korean market, in particular, provides opportunity for growth in products which have low and ultra low tar deliveries.

R&D Response:

Remain attuned to marketplace needs/wants through market tracking and full utilization of existing consumer panels.

Establish new consumer panels in international markets when possible.

Counter foreign competition with product development strategies which are innovative and aggressive.

Market-tailored product development programs.

Continue to support PM Europe R&D to provide effective solutions to problems common to both markets.

Aggressively pursue new product development opportunities as follows:

- Low Tar and Nicotine product development
- Menthol product development
- Project Ring (Korea)
- Market-tailored product development
- Project ART
- Sidestream products

R&D Programs:

- International Product Support
- Filtration Research
- Paper Technology/Reduced Sidestream
- Project ART

Alternate Scenario:

A lower volume increase could result if anti-smoking groups impact the Asian markets. New markets may not be opened to allow foreign competition.

2026230193

R&D Response:

The R&D response remains the same.

SEGMENTED CIGARETTE MARKET TRENDS

Status

A graphic analysis of each product category (non-filter, menthol, full flavored filter, lights filter, ultra low tar filters, slims/120's filter, generic, branded generics, value 25's, "price-off" (brands which carry a permanent coupon), and export is found in Appendix J. Both market share and growth rate data (1987-1989) are provided for each company and category. From this information, the following summary has been prepared to indicate which segments are dominated by PM products and which segments are underrepresented by PM products. PM does not compete in the "price-off" segment.

Market Segments Dominated by PM:

- Full Flavor Filter
- Lights Filter
- Ultra Lights Filter
- Slims/120's Filter
- Value 25's
- Export

Market Segments Underrepresented by PM:

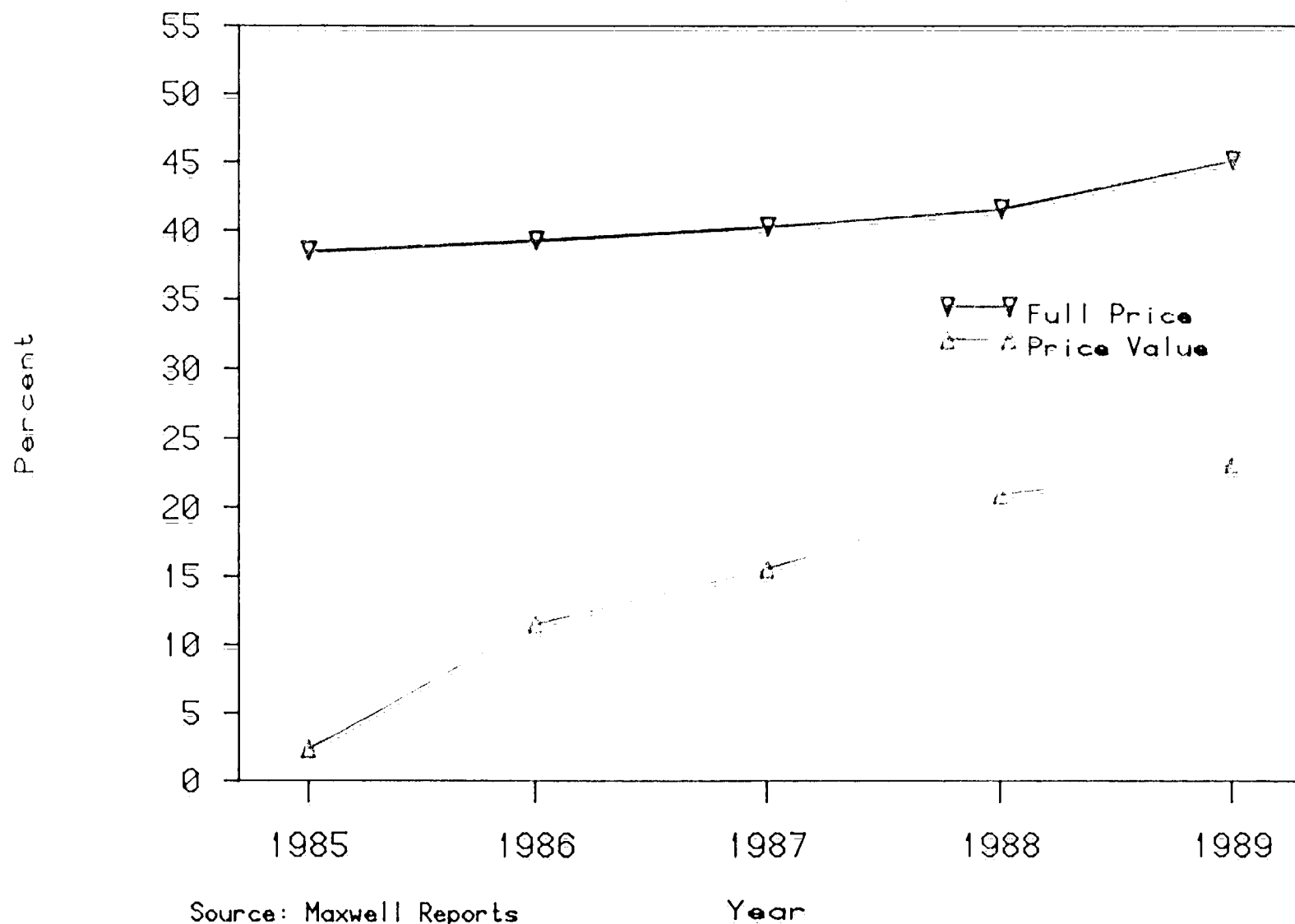
- Menthol
- Ultra Low Tar
- Price/Value

Menthol - The segment declined in 1989 to 140.81 billion units, but comprises 26.9% of the U.S. cigarette market. Salem and Kool declined while Newport increased to a 4.7% share. PM's Alpine showed growth with its entry into the price value category, and PM continued to dominate the 100mm menthol segment. However, PM remains underrepresented in the King Size menthol market (Figure 7). Although our market share is increasing slowly in the menthol segment (Figure 8), there is considerable discrepancy between our share of the menthol and non-menthol segment. R&D needs to continue to research the menthol market and develop menthol products which will provide a product advantage.

2026230194

Figure 7

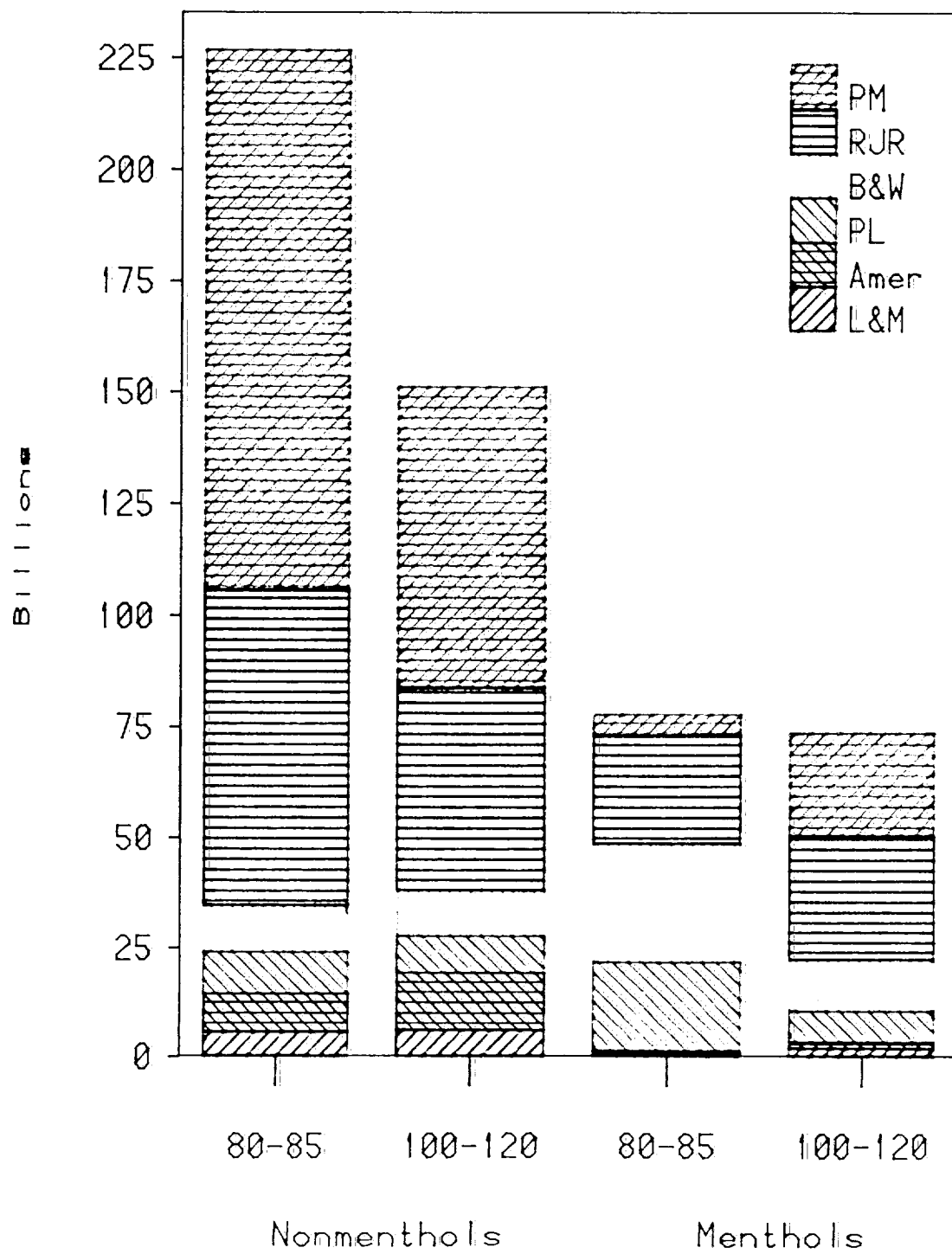
PM Share of Market, 1985-1989



2026230195

Figure 8.

Share of the Market



2026230196

Ultra Low Tar (<5.0mg tar) - While PM has a steady and respectable share of the full flavor and flavor low (lights-filter) markets, the ultra low segment shows an increase but still offers more opportunity for growth (Figure 9). Carlton (American Brands, Inc.) and Now (RJR) dominate this category and have a combined share of 2.7%, which has been constant for three years. This category is driven by health conscious consumers. The Low Tar/High Flavor Program (Project BOLD) spearheads our development efforts in this area along with developments from filter technology and paper technology.

In spite of an overall industry decline in unit volume, PM has achieved growth in the following segments from 1987-1989: total domestic market, lights filter segment (growth in Marlboro Lights); ultra lights filter segment (growth in Merit Ultra Lights); branded generics (growth in Cambridge, Alpine repositioning); generics; export (growth in most markets); and sub-generic (due to recent Bristol introduction).

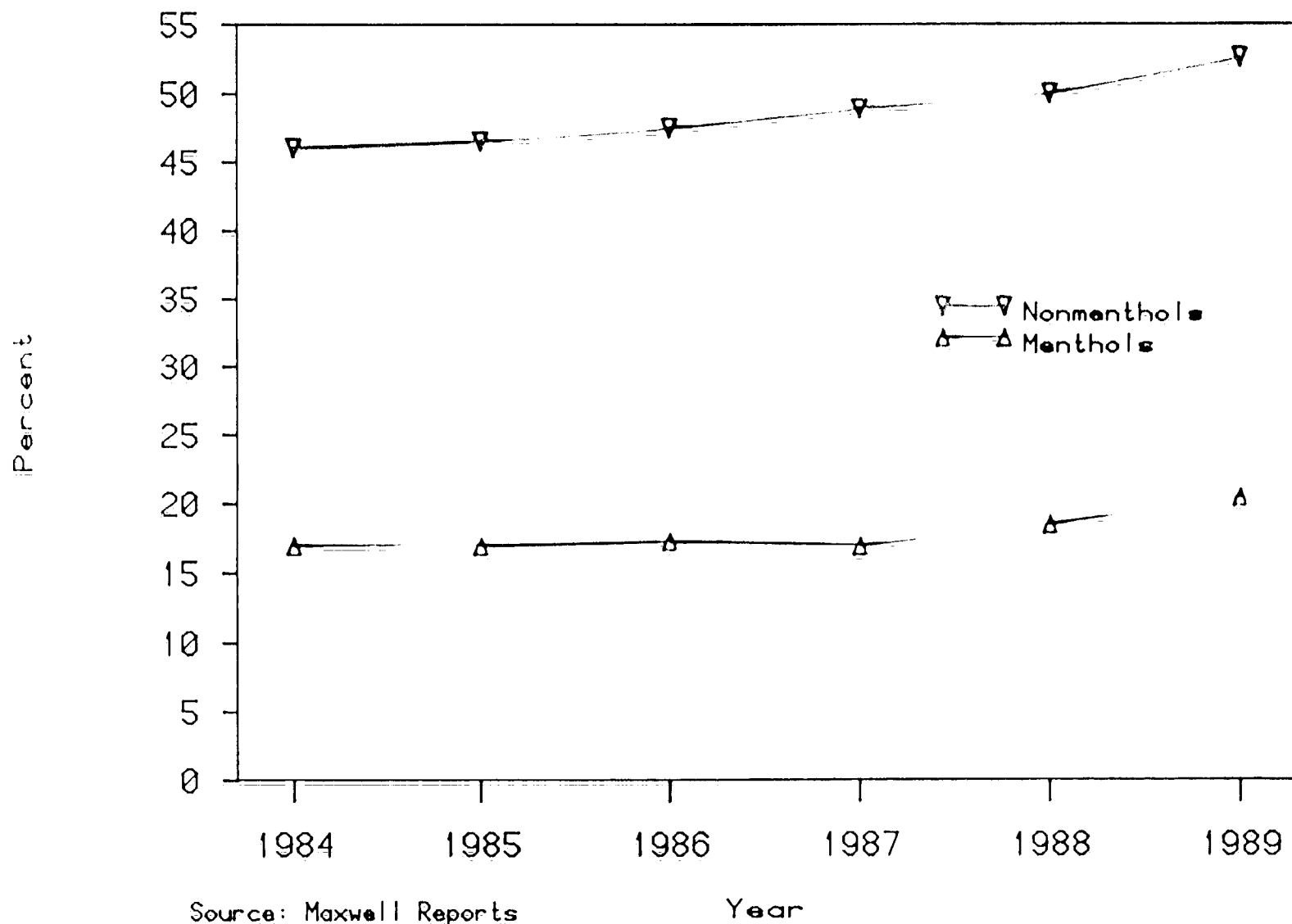
Price Value - Figure 10 shows that while PM's share of the price/value segment is growing, PM is significantly underrepresented in this area. The trends from 1988 and 1989 place this segment as the fastest growing and most active with new product introductions. 1989 saw the expansion of the category with the introduction of Pyramid (one of the most successfully introduced products in recent history) into the sub-generic price level. As of November 1990, Pyramid had a respectable year-to-date market share of 1.32%. PM has strong entries in this category with the branded generics Cambridge, Alpine and now Bucks in test market. The brand Bristol was introduced into the sub-generic price level.

As state governments increase taxes on cigarettes and the federal government increases excise taxes in an attempt to reduce the budget deficit, the price/value trend is likely to intensify. In addition to placing competitive products into the market place, we need to develop product specifications which are as cost effective as possible. The development of non-tobacco materials which are both functional and cost effective is a key element of these specifications. Our overall approach is to give the consumers a product of acceptable quality at competitive costs.

As has been mentioned, taxes on cigarettes are increasing. This, along with industry pricing policies, means our consumers are paying more for a pack of cigarettes. Thus, it is important to increase value to the consumer by maximizing the quality of our full margin brands. Maintaining subjective quality, automated inspection systems, freshness improvements, maintaining consistency and improved packaging are potential ways to increase benefit to the consumer. Maximizing the potential of our full margin brands will have a more significant impact on our profitability.

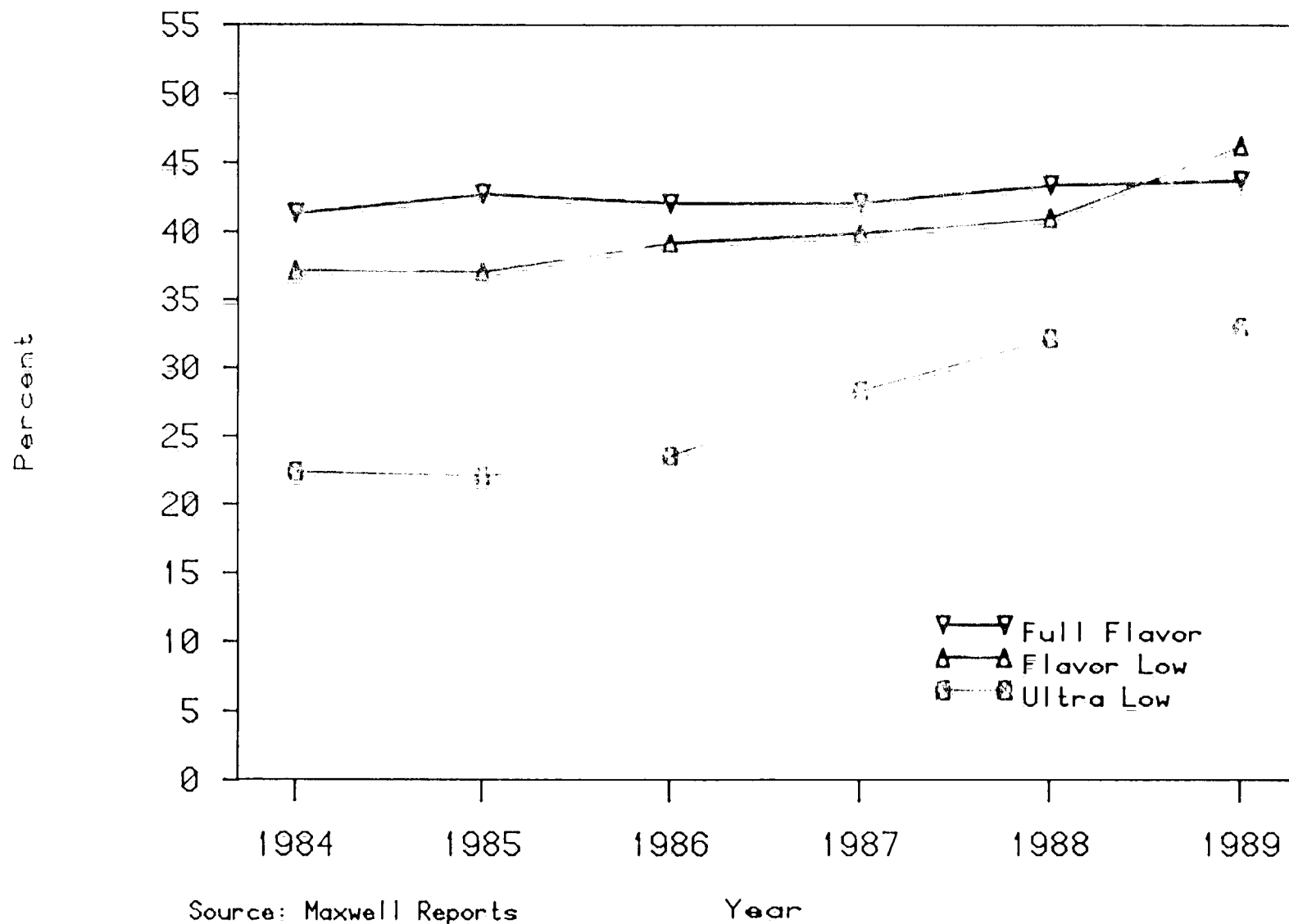
2026230197

Figure 9
PM Share of Market, 1984-1989



8610329202

Figure 10
PM Share of Market, 1984-1989



6610829202

A summary of PM's position relative to total market share and volume growth is shown in Table 21. This table shows that PM is positioned well and dominates all market segments which account for more than 5% of the industry's market volume with the exception of the menthol category. Table 22 provides an overview of the products and companies having significant impact in the compounded annual growth rates reported in Table 21. Recommendations on PM USA R&D's response to these market dynamics are consistent with those discussed in the section on Competitive Pressures-Domestic. These market trends, however, clearly provide additional information on the status of each segment (growing or declining) and assists in the proper positioning of PM products. For example, PM is underrepresented in the non-filter segment. However, the rapid decline of this segment (compounded annual industry growth rate 1987-1989 of -13.2%) and the minor contribution of this segment to the overall market (4.1%) lead to the conclusion that the non-filter segment is not of strategic interest. Social/political factors (health concerns and governmental regulations) support this conclusion.

PM's strategic approach to the price/value segment would be served best with branded generics (compounded annual industry growth rate 1987-1989 of +39.3%) and with the newly launched sub-generic category:

R&D Response:

Develop products with the aim of increasing market share in the following segments:

- Ultra Low Tar
- Menthol
- Price/Value

R&D Programs:

- Domestic Product Development
- Menthol
- Low Tar/High Flavor (Project BOLD)
- Filtration Research
- Flavors

PROJECTED SALES VOLUME

Status:

Projected Sales Volume figures from 1991-1995 are shown in Table 23. These figures reflect a forecasted increase in total PM volume of +2.7% over 1990 projected sales, and

2026230200

Table 21

**PM Versus Industry
Market Share and Growth**

Rank in Total Market	Segment	Share of Market Volume*	Total Industry 1987-1989 Growth Rate of Segment	Total Industry Minus PM 1987-1989 Growth Rate of Segment	PM's Growth in Segment	PM's Share Of Segment
1.	Export	27.2%	+16.9%	+23.6%	+12.3%	56.2%
2.	Full-Flavored Filter	26.0%	-8.7%	-16.9%	-2.5%	62.5%
3.	Menthol	25.6%	-6.5%	-7.4%	-2.8%	19.2%
4.	Light Filter	21.5%	-4.1%	-12.5%	+1.6%	65.1%
5.	Branded Generics	10.1%	+39.3%	+34.6%	+53.7%	28.6%
6.	Ultra Light Filter	4.9%	-4.2%	-8.8%	+3.5%	41.6%
7.	Non-Filter	4.1%	-13.2%	-13.2%	-14.6%	1.6%
8.	Slims/120's	2.9%	-5.7%	-9.5%	-3.0%	61.4%
9.	Generics	2.7%	-22.3%	-25.6%	+35.2%	12.0%
10.	Ultra Low Tar (<0.5 mg tar)	1.6%	-9.8%	-5.0%	-82.7%**	0.4%
11.	Price-Off	2.0%	+0.5%	+0.5%	--	--
12.	Sub-Generics	0.9%	--	--	--	4.5%
13.	Value 25's	0.4%	-36.3%	-41.5%	-25.7%	41.0%

*Products may have been considered in more than one segment.

**Cambridge <0.5 discontinued.

2026230201

Table 22

**Products/Companies Having Significant Impact on the 1987-1989
Compounded Annual Growth Rate for Domestic Product Sectors:**

<u>Segment</u>	<u>Industry - PM</u>	<u>PM</u>
1. Full-Flavor Filtered	(-) Winston	(-) Marlboro
2. Export	(+25.6%) RJR (+22.4%) B&W (+8.7%) AB	(+12.3%) PM
3. Menthol	(-) Salem (-) Kool (+) Newport	(-) Marlboro Menthol (-) Marlboro Lts. Menthol (-) Va Slims Menthol (-) Cambridge Lts. Menthol
4. Lights Filter	(-) Winston Lights	(+) Marlboro Lights
5. Branded Generics	(+) Doral (+) Richland (+) American Lts.	(+) Cambridge (+) Alpine
6. Ultra Light Filter	(-) Winston UL (-) Vantage UL (-) Kent UL	(+) Merit UL
7. Non-Filter	(-) Camel (-) Pall Mall (-) Lucky Strike (-) Chesterfield	(-) Commander
8. Slims/120's	(-) More	(-) Virginia Slims (-) Saratoga

2026230202

Table 22 continued)

**Products/Companies Having Significant Impact on the 1987-1989
Compounded Annual Growth Rate for Domestic Product Sectors:**

<u>Segment</u>	<u>Industry - PM</u>	<u>PM</u>
9. Generics	(-21.3%) B&W (-29.1%) LG	(+35.2%) PM
10. Ultra Low Tar (0.5 mg tar)	(-) Now (-) Barclay	(-) Cambridge (<0.5) discontinued
11. Price-Off	(-) Raleigh (-) Belair (+) Malibu (-) Chesterfield	
12. Sub-Generic	(+) Pyramid	(+) Bristol
13. Value 25's	(-) Richland 25's (-) Newport 25's	(-) Players Lts. 25's

2026230203

Table 23

PM USA FIVE YEAR FORECAST

11/20/90

	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>
Marlboro						
Non-menthol (E)	132,561	133,423	126,547	124,019	118,902	116,281
Menthol	2,311	2,105	1,958	1,801	1,693	1,591
New	308	360	7,405	10,025	16,757	19,516
Total Marlboro	135,180	135,888	135,910	135,845	137,351	137,388
Benson & Hedges	18,567	17,813	21,096	19,625	17,982	16,535
Mertit	18,468	16,486	15,059	15,371	14,369	14,465
Next	40	60	60	60	60	60
Virginia Slims	16,135	14,966	14,243	13,726	13,387	12,829
Parliament	4,327	4,025	3,804	3,497	3,289	3,125
Other Full Margin	1,731	1,551	1,380	1,185	1,043	939
Cambridge	13,178	14,082	15,110	16,723	18,123	19,559
Alpine	3,286	3,333	3,516	3,893	4,223	4,560
Bristol	4,029	5,441	6,206	7,345	8,186	8,865
Players 25's	680	516	422	363	327	302
FVB	3,120	4,080	4,008	3,835	3,531	3,242
Bucks	1,259	3,060	3,187	3,530	3,827	4,133
New Products (Net)	0	0	0	0	0	0
Total Full Margin	194,448	190,788	191,551	189,311	187,483	185,339
Total Price Value	25,552	30,512	32,449	35,689	38,217	40,661
Total PM USA*	220,000	221,300	224,000	225,000	225,700	226,000
Industry	526,750	507,900	495,300	479,000	467,100	455,500
Full Margin	427,721	397,686	377,914	353,502	338,180	323,405
Price Value	99,029	110,214	117,386	125,498	128,920	132,095

*Domestic Only

2026230204

an increase in PM market share from 41.7% in 1990 to 49.6% in 1995 in spite of a total industry decline of 13.5% from 1990 to 1995.

R&D Response:

Several key strategies will be necessary to maintain income, volume and market share increases over the next five year period. These strategies involve an emphasis on full-margin brands in order to maximize profitability. In order to accomplish these goals, existing brand families need to be completed where strategically profitable. Markets underrepresented by PM need to be penetrated, and new market segments which provide benefits to consumers need to be developed. Finally, products which address external requirements facing the industry need to be developed as necessary.

R&D Programs:

- Domestic Product Development
- Menthol
- Paper Technology/Reduced Sidestream
- Low Tar/High Flavor
- Filtration Research
- Flavors

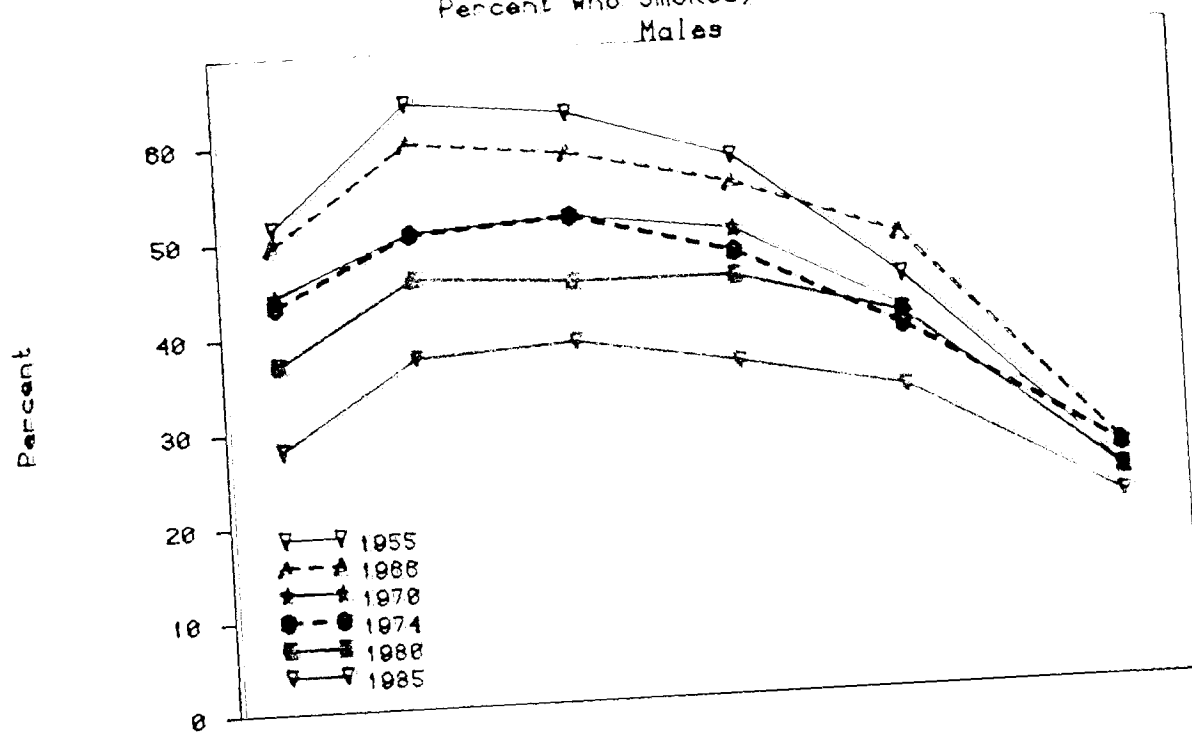
DEMOGRAPHICS

Status:

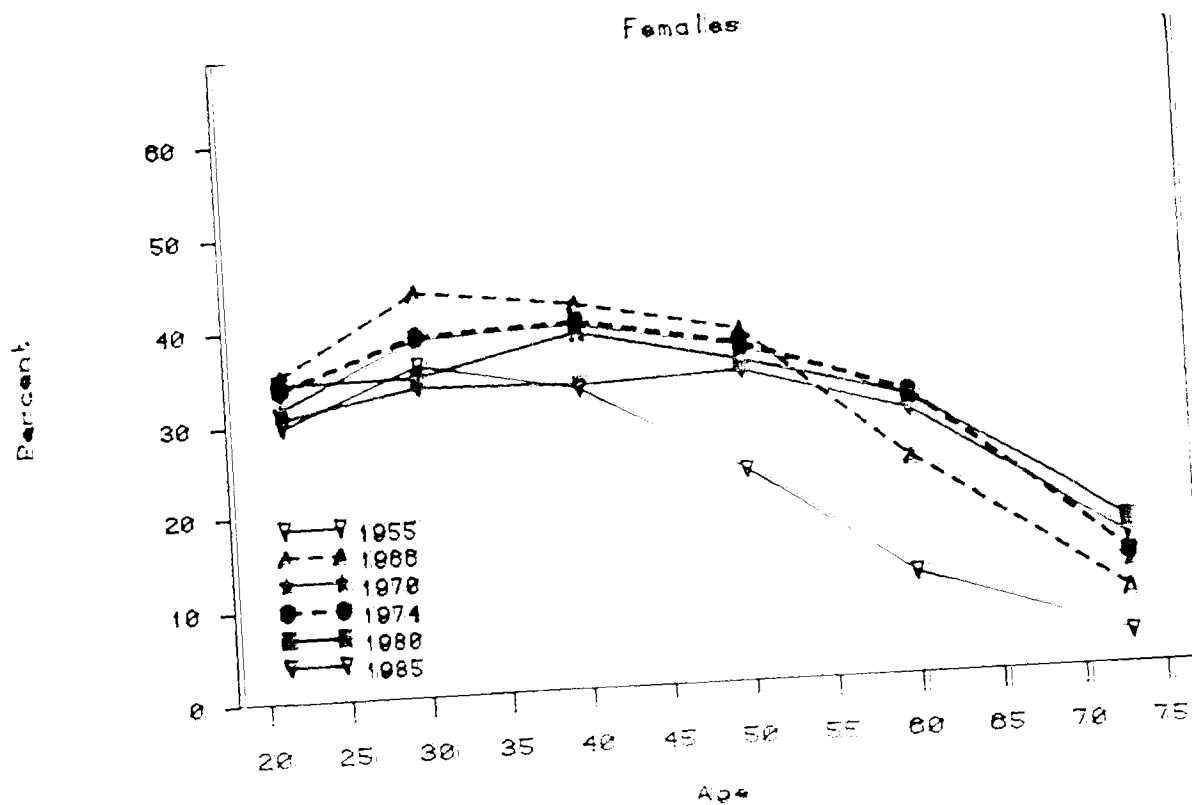
Many factors contribute to cigarette consumption decline, and the changing U.S. population is one of them. As the population ages, cigarette smoking declines (Figure 11). Figure 12 shows a population shift that occurred prior to 1990. In the age group 18 to 34, for the first time, the 30-34 year olds dominate. Prior to that date, the 25-29 year old age group was the largest segment. In the 35 and older group (Figure 13), the 35-44's dominate with an increasing 45-54 year old group. An association of smoking trends to this pattern again points to a reduction in cigarette consumption.

Company share of smokers by age (Figure 14) demonstrates PM's lead up to age 40. RJR has been successful in attracting smokers over the age of 40. These two companies represented a total of 70.4% of the U.S. cigarette market in 1989. American shows growth of share starting with smokers at age 40. The brands which contribute to this growth are in the price value category (Malibu, American Full Flavor and Lights, and Montclair) as well as their Carlton brand. The trends in the price value category (Figure 15, top) over the past three years indicate strong growth in the branded generics. This

Figure 11
Percent Who Smoked, 1955-1985
Males



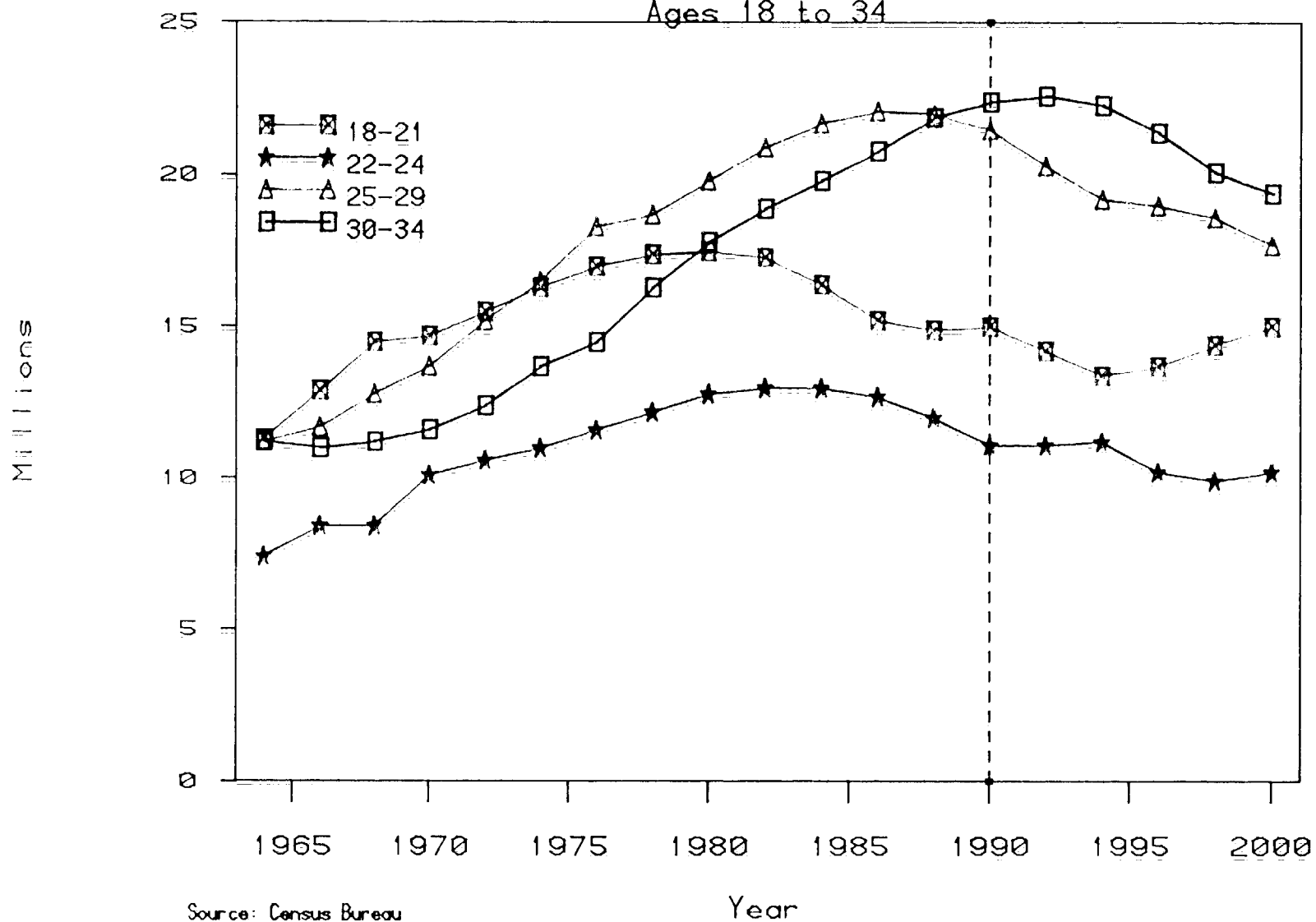
Females



Source: Public Health Service

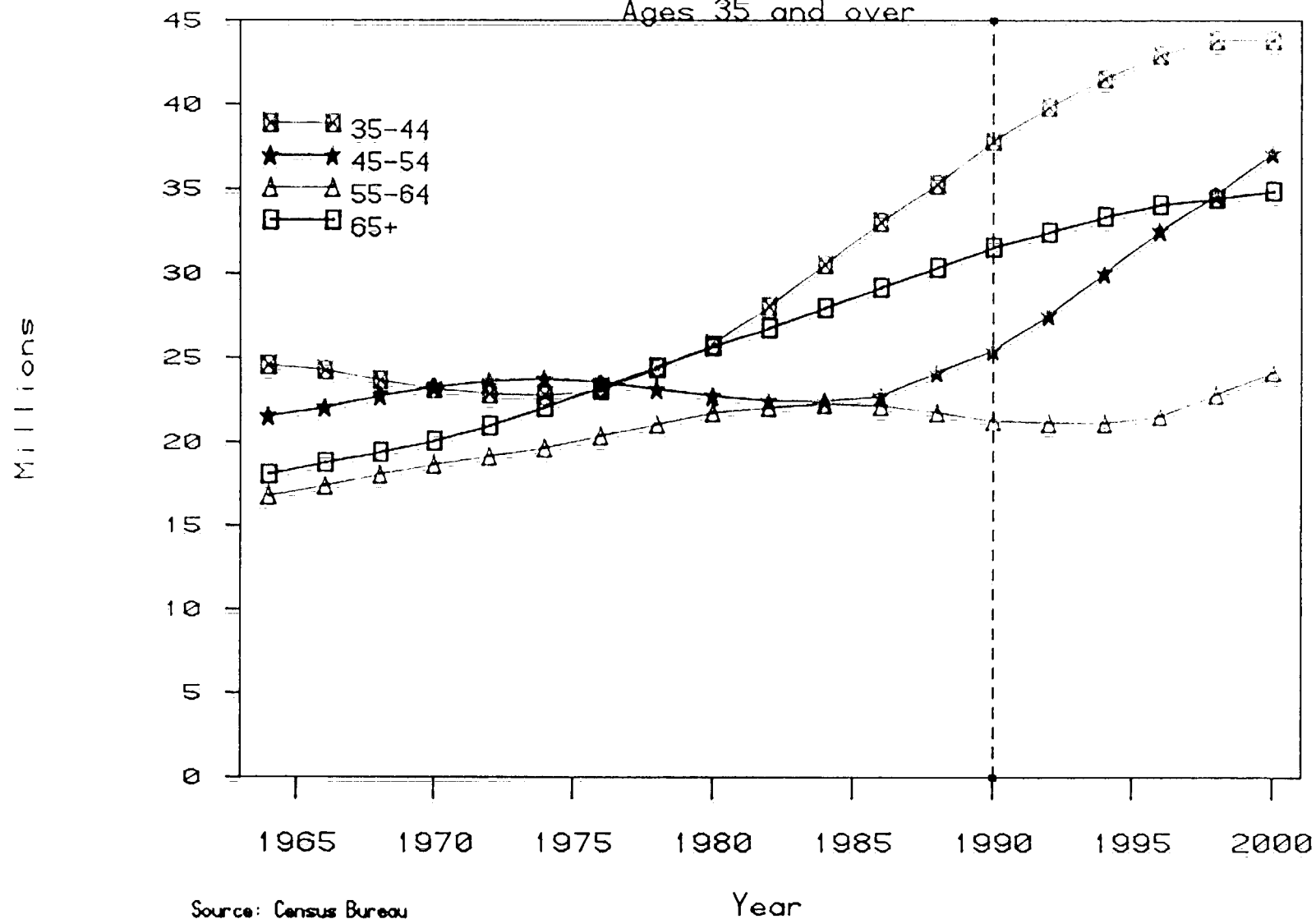
2026230206

Figure 12
Population Estimates and Projections
Ages 18 to 34



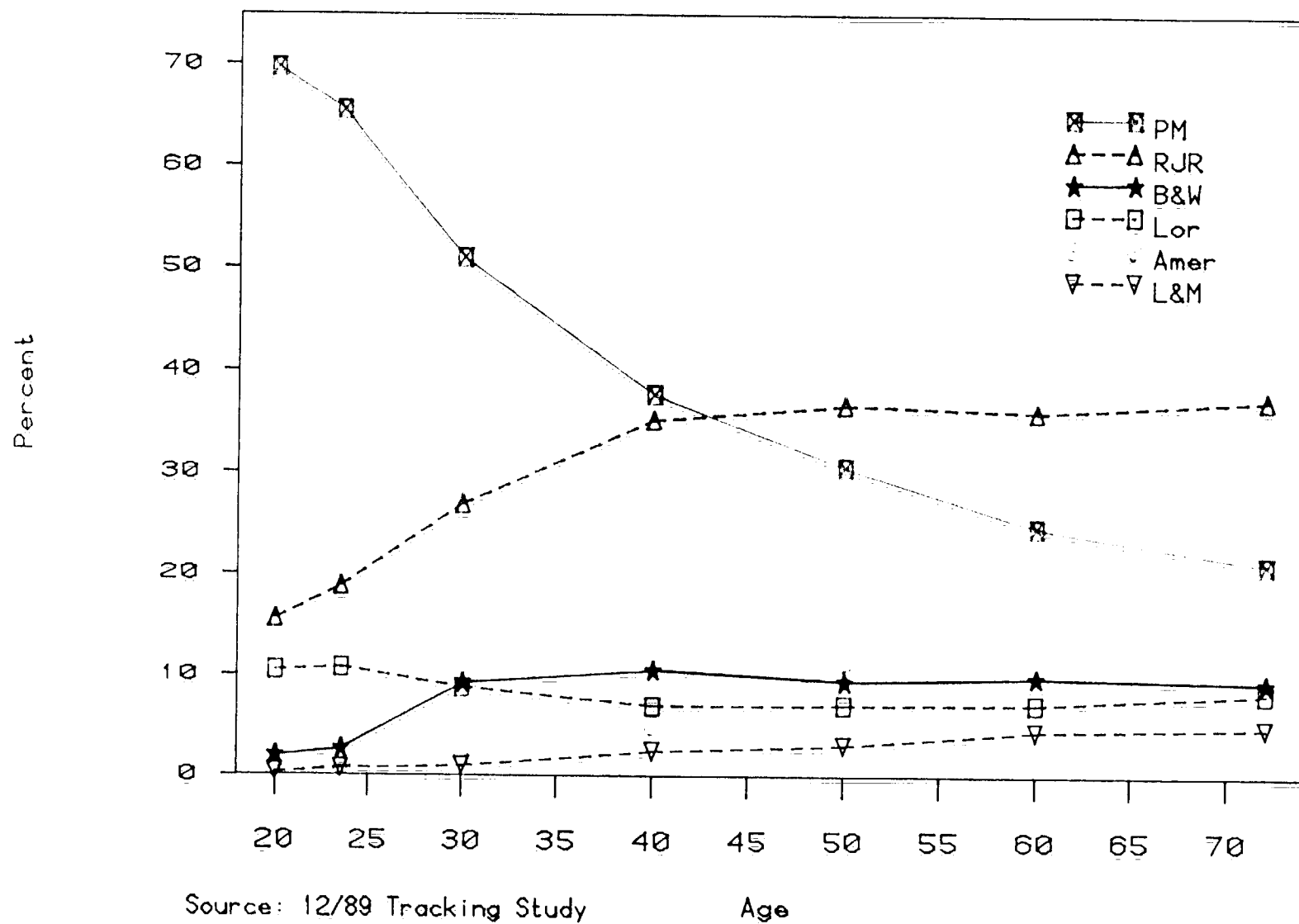
2020329202

Figure 13
Population Estimates and Projections
Ages 35 and over



8020329202

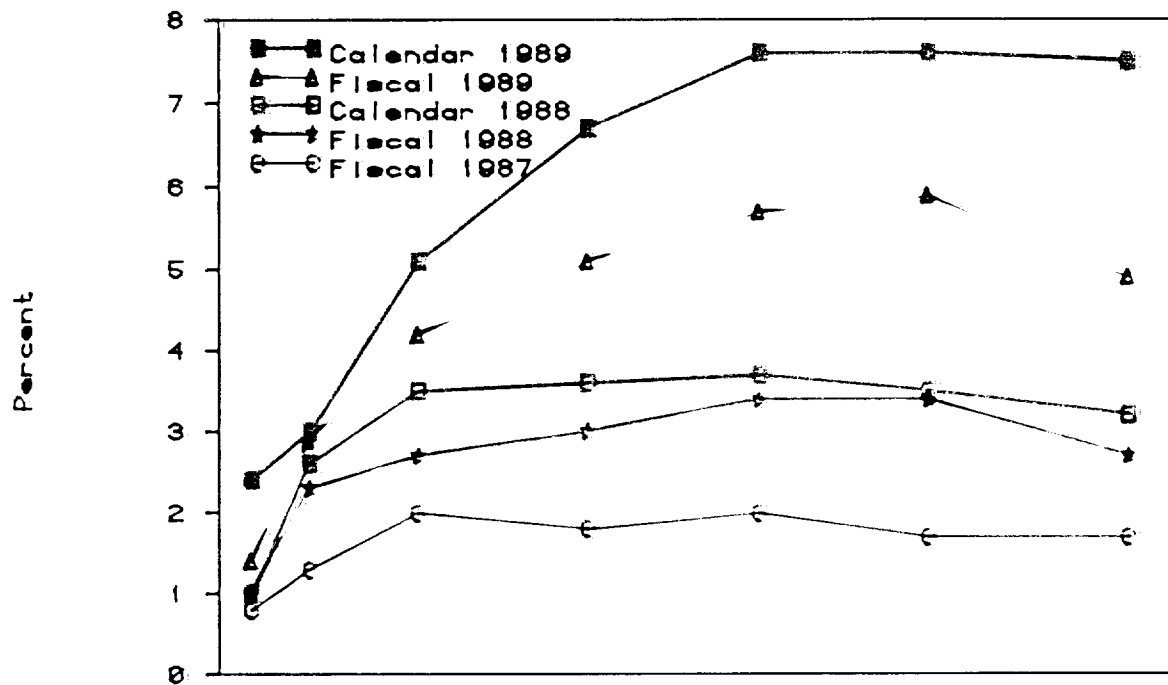
Figure 14
Company Share of Smokers, by Age



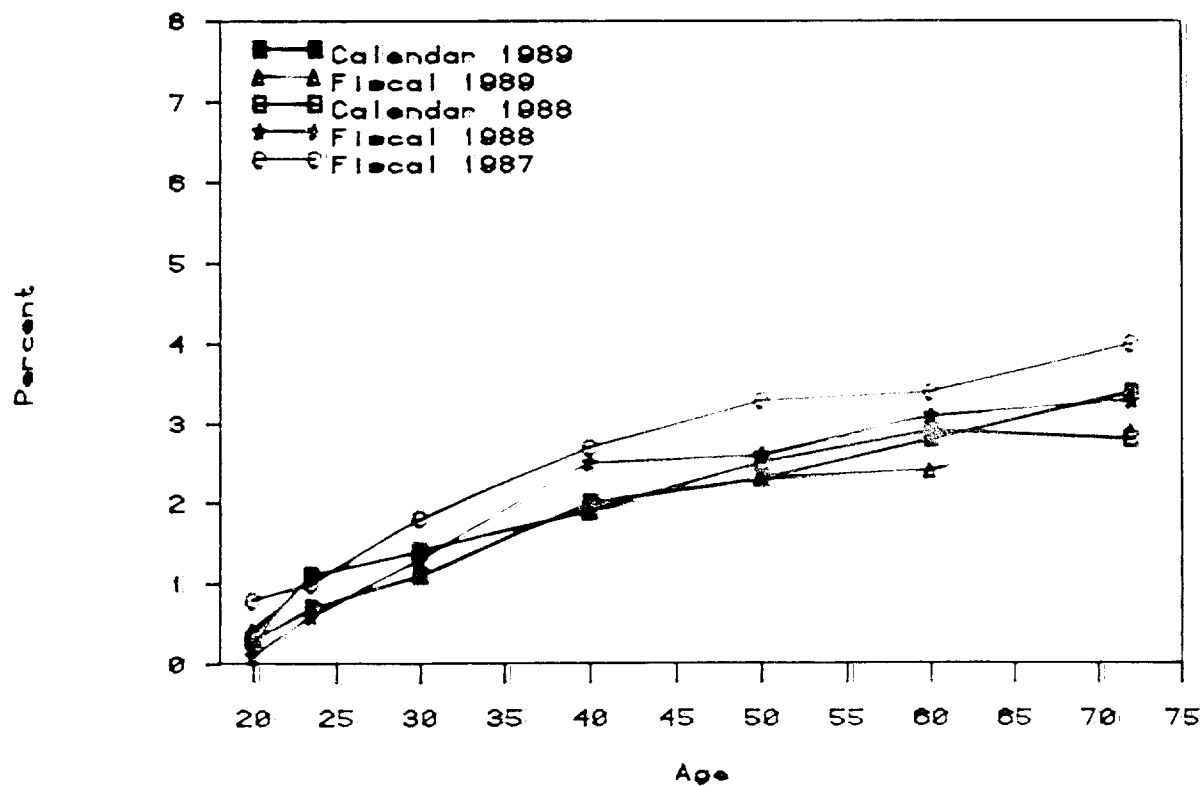
2020329202

Figure 15

Percent who Smoke Branded Generics



Percent who Smoke B&W Generics



Source: Tracking Studies

2026230210

trend peaks at age 50 where 7.5% of this age category smoke branded generics. The growth of black and whites peaked in 1987 and has declined since (Figure 15, bottom).

A review of age related trends (Figure 16) shows the full flavor filter category strongest in the 20 and 25 year old groups. At age 30, both the full flavor and flavor low shares are equal, with Flavor Low having less of a decline than full flavor with increasing age. Other than the strength of non-filter among older smokers, the ultra low share increased to just under 20% with older smokers.

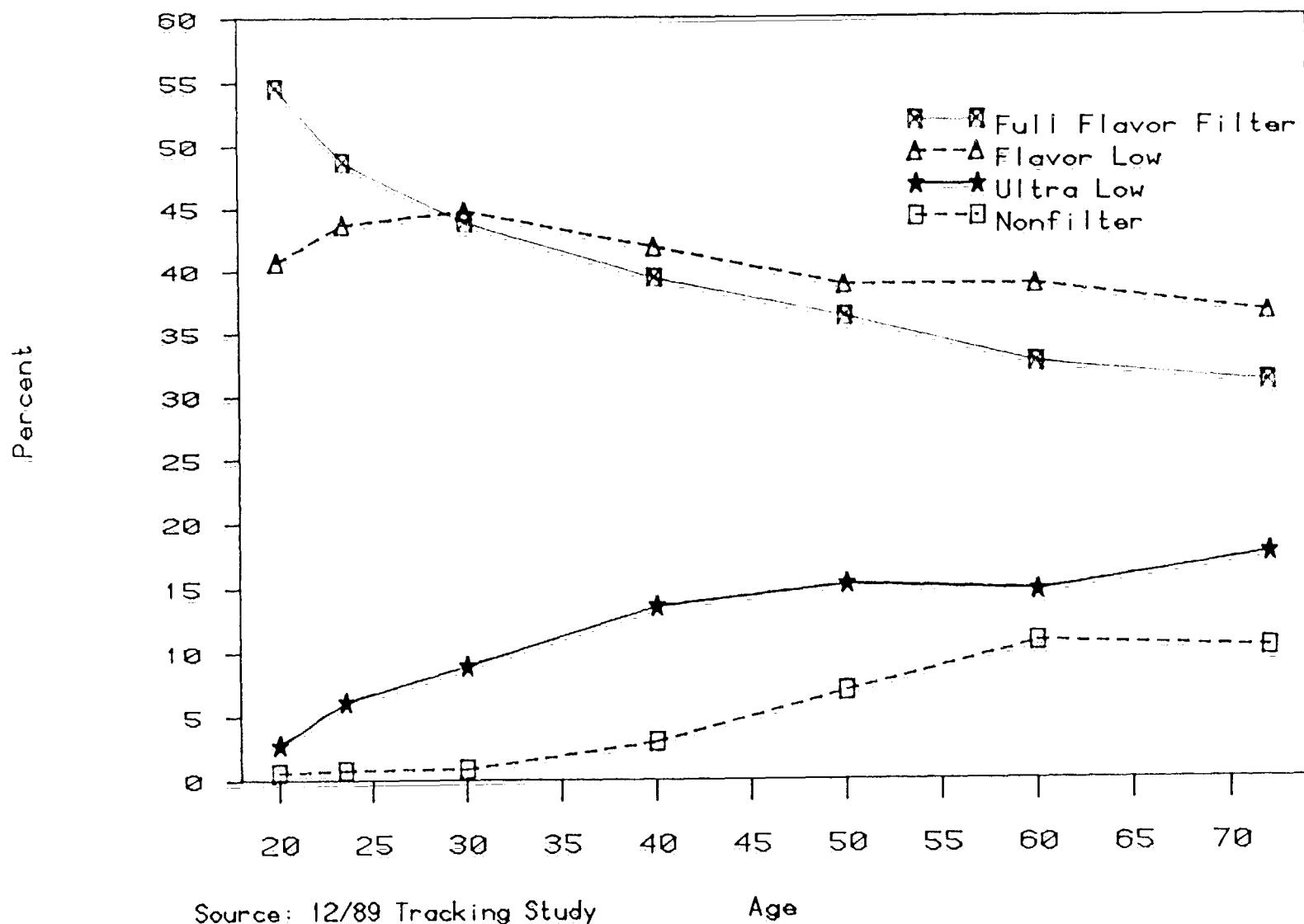
Interesting demographic-related strategies may be derived from the recent data in the Consumer Tracking Study-Year Ending December, 1989. PM's share of male smokers exceeded 40% and PM's share of female smokers exceeded 42% (Figure 17). PM's gain this past year can be attributed equally to men (1.7%) and women (1.7%) smokers. RJR, however, lost equally among both men (-1.5%) and women (-1.8%). With Capri, B&W experienced a slight increase among women smokers (0.2%), but a decline among men (0.9%).

The domestic Hispanic population is increasing as are the percent of Hispanics who smoke and the number of female Hispanics who smoke. PM is well positioned with this segment with Marlboro and B&H (non-menthol). However, PM is not well positioned with respect to Puerto Ricans largely because of our underrepresentation in the menthol category. Responses to the menthol challenge are addressed in the menthol segment section.

A review of Marlboro demographics is also a review of the 18-25 year old age group (Figure 18). In 1989, Marlboro's share of that smoker group was in excess of 60%. The brand's strength since 1977 has been in that age group. A chart of P.M.'s share of smokers by age (Figure 19) has the same slope as that of Marlboro (Figure 18). The continued success of this brand depends on keeping its age profile young. This fact then would say that we do not want Marlboro or the Marlboro image to be old. Its success through the years has been its ability to attract the entry smoker. Then at a point in time, around 30 years of age, the smoker will choose another brand. It is important to understand the factors affecting this switch in brand so that we can adequately provide new choices for these consumers. This trend is also important for the life of Marlboro. Marlboro's sales are influenced by four packings: Marlboro Full Flavor Box and Soft Pack, and Marlboro Lights Box and Soft Pack. They all have their largest share among the 20-25 year olds and show a decline with older smokers (Figure 20).

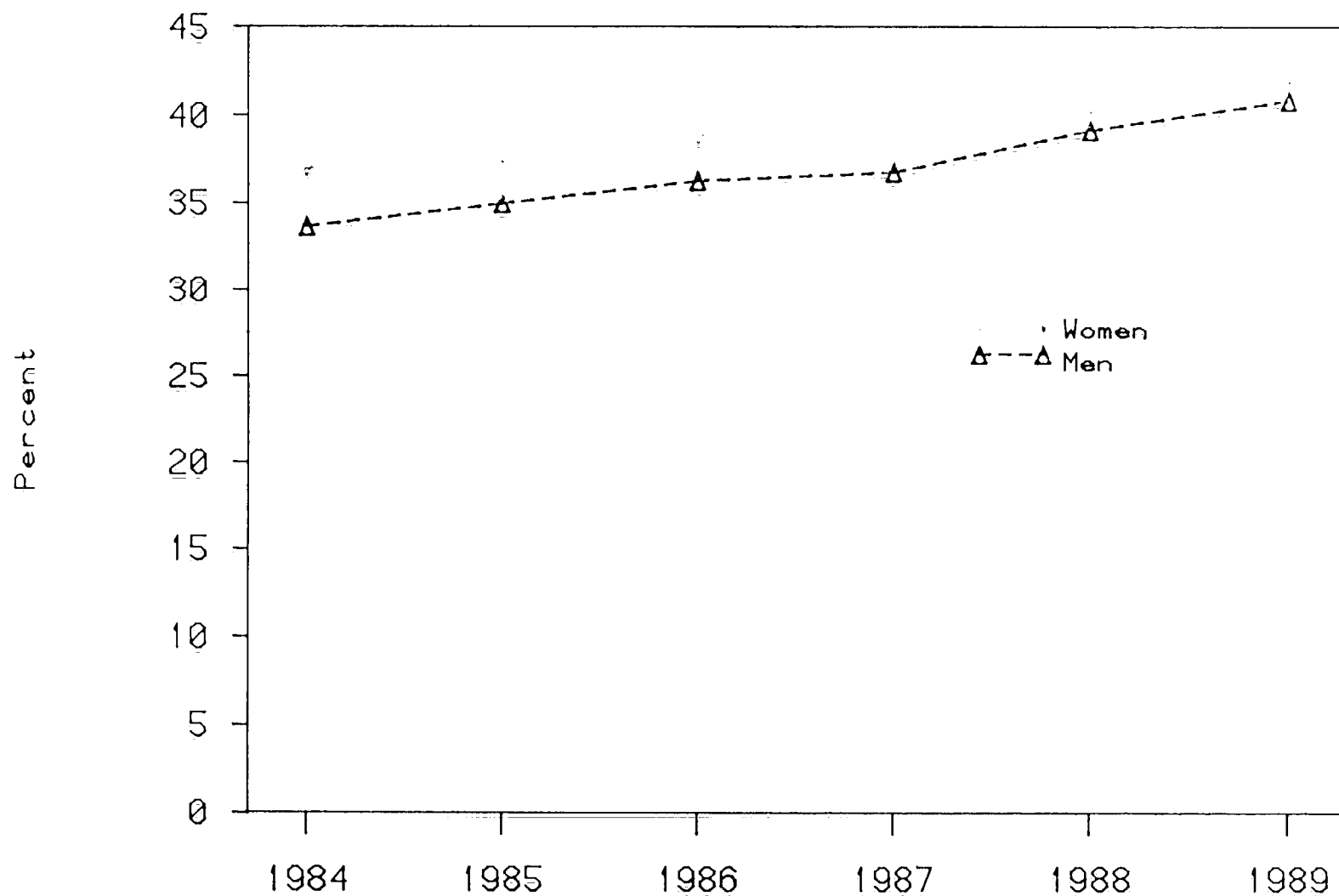
These sales trends suggest several possibilities. The first is to maintain Marlboro as a brand of choice for the 20-25 year olds. The second is to offer a choice to the smokers who are leaving the Marlboro full flavor and lights packings. This is important for two

Figure 16
Share of Smokers, by Age



2026230212

Figure 17
PM Share of Smokers, 1984-1989

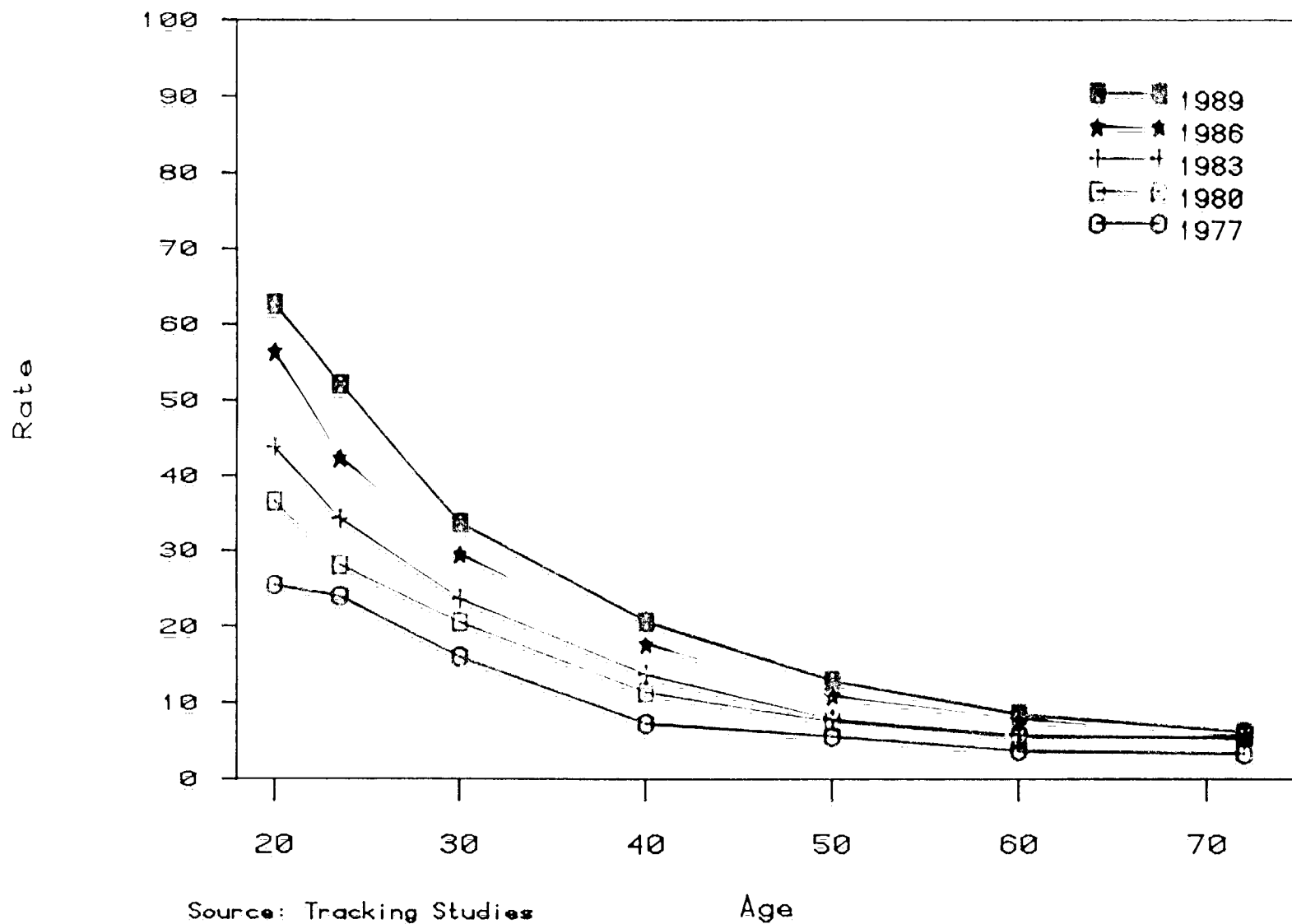


Source: 12/89 Tracking Study

Year

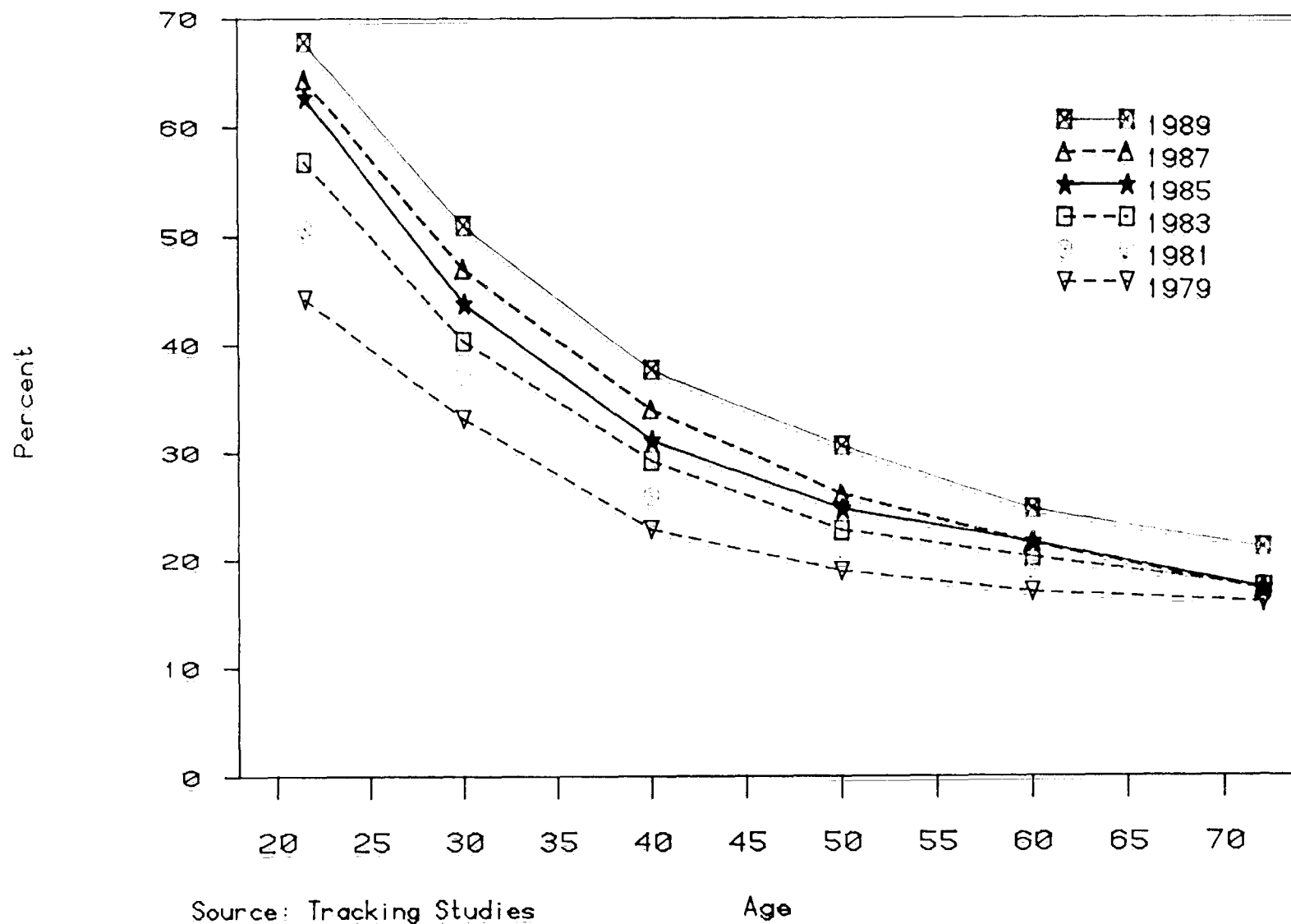
2026230213

Figure 18
Marlboro Share of Smokers, 1977-1989



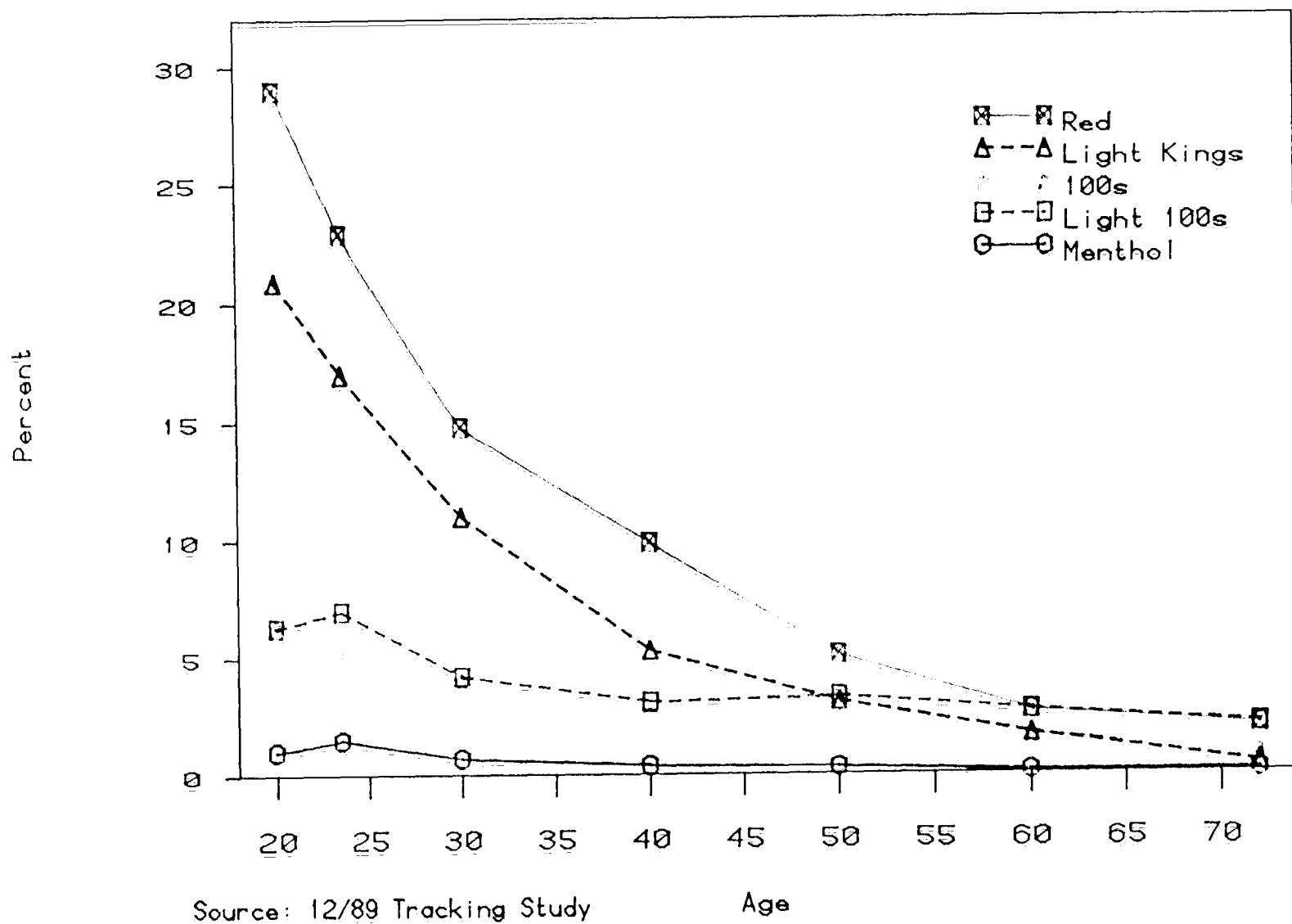
2026230214

Figure 19
Percent Who Smoke Any PM Brand



2026230215

Figure 20
Percent Who Smoke Marlboro, by Age



2026230216

reasons. One is to attract the older smoker out of Marlboro, and the second is to keep this smoker within the PM family of brands.

From a competitive standpoint, we must continue to monitor the marketplace and be prepared to counter any inroads by another brand into the 20-25 age group. Camel appears to be threatening Marlboro, particularly in the 18-21 year age group. However, several important facts need to be considered when evaluating this situation. First, Camel appears to be attracting young white males in the western part of the country in the 18-21 age group. The Camel advertising campaign clearly focuses on this segment. Marlboro, on the other hand, remains strong in the 21-25 year group, and appeals to young white males in the eastern part of the country as well as a growing number of young females. Therefore, Camel appears to be capturing a small, declining, and highly specific segment of the market and does not appear to be a general threat to Marlboro at this time.

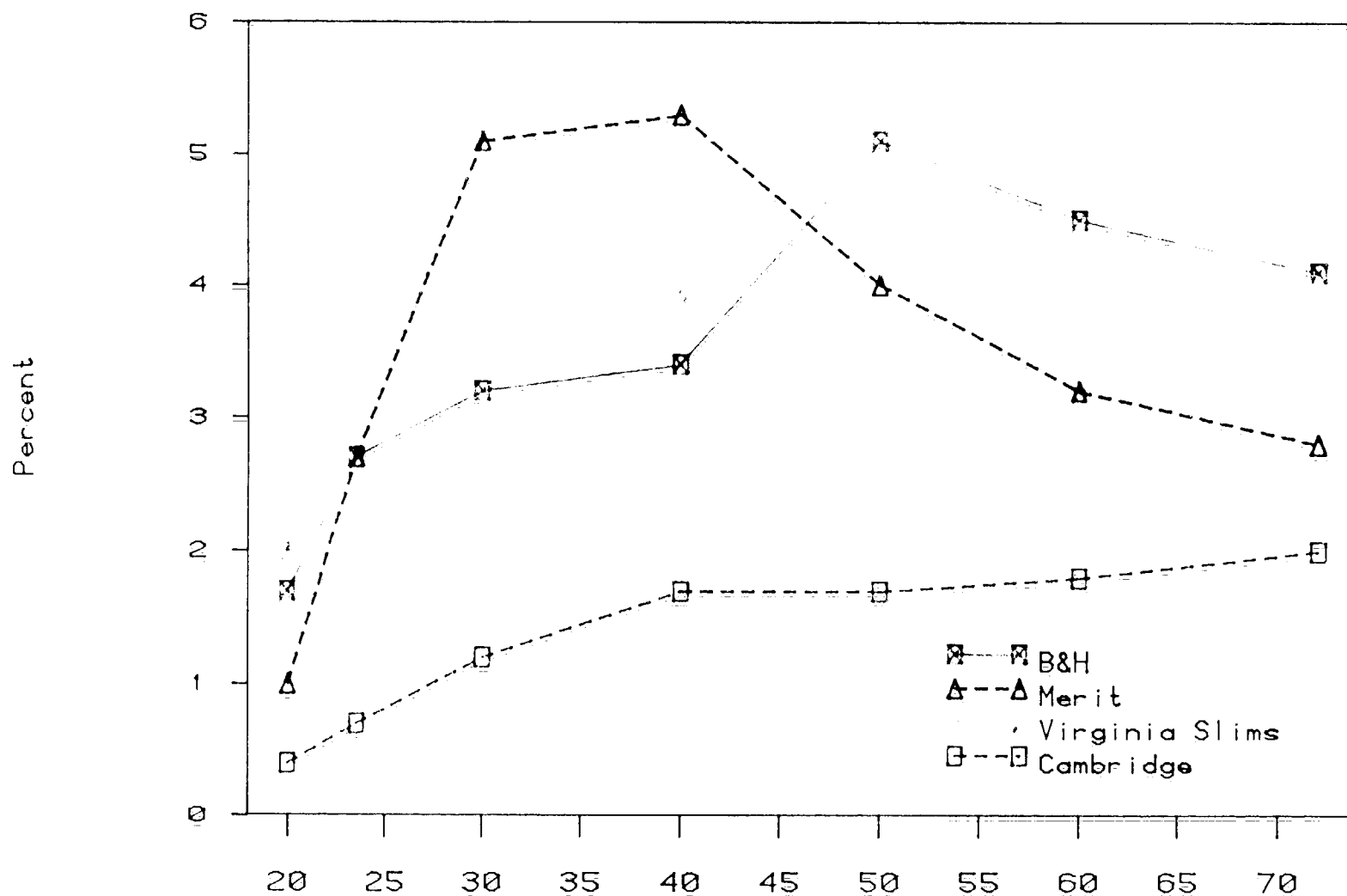
R&D Response:

The test market of Marlboro Ultra Lights is a major opportunity. Share trends indicate that lower tar deliveries are more popular with the older smokers. Therefore, an ultra lights Marlboro entry into the market could offer to the older smoker an appropriate alternative. Other products and brand franchises also need to be positioned to attract smokers of 30 years of age and older. Figure 21 shows that currently B&H, Merit, Virginia Slims, and Cambridge tend to attract older smokers.

Possibilities include:

1. Extension of the B&H family into a king size packing;
2. Extension of the Merit family into 1 to 2mg packing.
The Merit family has been successful in the age categories of 30 years of age and older;
3. The possibility of opening up a new category in the market place. That of a nicotine segment with products developed from the Art program. We could offer lower nicotine as well as 1/2 of the nicotine of conventional products;
4. It is evident that older smokers are being attracted to the branded generic category. The continued growth of our Cambridge and Alpine brands, as well as new launches, such as the Bucks brand, will help increase our share in the branded

Figure 21
Percent Who Smoke Other PM Brands, by Age



Source: 12/89 Tracking Study

Age

8120329202

generics category;

5. Products developed from new technologies, such as low sidestream or altered sidestream odor, could be important in developing new alternatives for the older smoker.

R&D Programs:

Domestic Product Development
Project ART
Paper Technology/Reduced Sidestream
Project Ambrosia
Project BOLD-Low Tar/High Flavor

NEW MARKET FOCUSES

Status:

Our review of 1989 market activities delivers a message that the market is changing and our competitors are largely responsible for initially changing the market. All of our competitors have entered into the price value category. RJR has opened new segments relating to the social aspects of cigarettes with Vantage Excel and Chelsea. Even our vendors have patented new technology to be used in the manufacture of cigarettes. An example is the Ecusta patent for application of aroma release compounds to cigarette paper. The reality of RJR's Premier is still with us, even though it has been removed from the market. There were problems with the product execution, but not with the product concept. The potential viability of these products is visible to the cigarette industry, and to other industries with expertise in aerosol generation and delivery devices.

The test markets of Next and Merit De-Nic™ clearly open a new technology segment of the market for which PM can take credit. Continued development of the product and other uses of the De-Nic™ process, such as half-nic, give PM a clear advantage in the market place. However, success of these products could lead to other products by the competition in this category. We have also introduced the Marlboro Ultra Lights product into test market. The national introduction of this product will expand this segment. Our Low Tar/High Flavor Program needs to continue to develop products in this delivery range as well as the ultra low tar range that deliver taste at lower tar and nicotine.

2026230219

Likely Scenario:

Competition in the new product area will continue. 1989 was one of the most active years for new product introductions in recent times. A total of 68 new products were introduced (see Table 16). Given the declining market, that the industry is committed to gaining market share with new introductions. These introductions were not only brand extensions or repositioning into the price/value category, but also products with features which could be conveyed to the consumer by marketing and product performance. This trend will continue as the industry competes for share and volume in the U.S. market. Projections would have Liggett almost nonexistent in the U.S. market, yet with a bold move in the price/value category, Liggett gained in volume and market share.

With a strategy to focus on full-margin trends, PM must follow the price/value category closely and provide superior products which meet the pricing strategies of our competitors. PM, more importantly, must continue to strengthen both internal and external resources essential to the development of innovative new products which address the concerns of our consumers of cigarettes.

R&D Programs:

- Project Sigma and Beta
- Project ART
- Reduced Sidestream/Paper Technology
- Filter Technology
- Project Ambrosia
- Low Tar/High Flavor

Alternate Scenario:

The declining market could accelerate and traditional cigarettes could become less of a factor in the U.S. market. Several factors could contribute to a lack of competition in the U.S. market and less innovation in new products. These include such factors as the buy-out of a tobacco company and the resulting "milking of the business" for maximum profit, and reliance on the price value category for market share with limited investment in innovative new products.

R&D Response:

R&D needs to produce innovative products which will provide benefits to the consumer. Considering our competitors, PM USA is uniquely positioned to take maximum advantage of this strategy. With a growing market share, superb financial base, and lack

of dependence on the price/value category, PM USA has a clear opportunity to best impact the market with innovative products.

SOCIAL/POLITICAL FACTORS

PERCEIVED HEALTH CONCERNS

Status:

There have been many papers published in the external scientific literature regarding smoking and health. A large proportion of those papers deal with genotoxicity in cell cultures, laboratory animals and humans. There is some work being published regarding individual differences in susceptibility to the potential effects of smoke. A considerable amount of information on the biological effects of smoke has been published by RJR. Most of the data published by RJR compare the effect of smoke from a cigarette which burns tobacco to smoke from a cigarette which only heats tobacco. There continues to be a lack of studies published which demonstrate the induction of lung cancer in laboratory animals by cigarette smoke.

Surgeon General's Report - The US Surgeon General, Dr. Novella, issued a report this year which covered smoking cessation benefits, and sales and health concerns in third world countries, particularly Latin America. The role of the new US Surgeon General as a force in public health smoking concerns has not yet crystallized. Contributing to this lack of a current strong public posture by the US Surgeon General is the prominent position which Secretary of HHS, Dr. Louis Sullivan, has taken in this area.

Likely Scenario:

As mentioned in previous plans, the purported effects of smoking on health have been extensively publicized. The greatest concern of the public and anti-smoking groups appears to be the health of nonsmokers exposed to environmental tobacco smoke (ETS). The EPA has issued a preliminary document declaring that ETS is a carcinogen. If this document is approved, ETS could be regulated as a workplace carcinogen through NIOSH/OSHA. Legislation has been enacted in Virginia, for example, to limit the places where people can enjoy our products. Additionally, consumer research has indicated that a product perceived to have fewer health problems would be appealing to current smokers if it was subjectively and economically acceptable. Products which address the concerns of the consumer as well as those of nonsmokers would have a positive impact on the industry.

2026230221

R&D Programs:

- Project Beta
- Project ART
- Selective Filtration
- Low Tar/High Flavor Program
- Lowered Biological Activity Program
- Tobacco Specific Nitrosamine Program
- Reduced Sidestream Program
- Project PACT

Alternate Scenario:

There is one development that would significantly affect the tobacco industry: the clear establishment of a causal link between smoke exposure in laboratory animals and the development of lung cancer. The Lovelace Inhalation Toxicology Research Institute (ITRI) is actively conducting research in this area. Additionally, Dr. R. O. McClellan, the former director of ITRI, is now the director at the Chemical Industry Institute of Toxicology (CIIT). He is in a position to continue and expand the work being conducted at ITRI.

R&D Response:

Continue fundamental research on the biological effects of cigarette smoke (mainstream/sidestream). Work should be focused on confirming outside findings and monitoring product changes. This response is being addressed by the Lowered Biological Activity Program and other research efforts conducted under PM USA direction.

If specific compounds in smoke are found which are causally involved in the formation of lung tumors (as noted above, this link is not yet established), work should be conducted to remove those chemicals from smoke. The Tobacco Specific Nitrosamine Program, the Selective Filtration Program, and Project ART are currently directed toward perceived health issues. It is anticipated that the Company will need to increase efforts in this area in the latter part of the plan period.

Develop novel products which produce a significantly different "smoke".

2026230222

SOCIAL ACCEPTABILITY

Status:

The social environment for both smokers and non-smokers has changed due to the anti-smoking media coverage and the display of No-Smoking signs. In this environment, the decision process for the smoker has now changed from one of, *To smoke*, to one of *Not To Smoke*. In a smoker's world there are now more cues not to smoke generated by the number of smoking restrictions in the workplace, shopping malls, restaurants and airports. Through all of this, the emergence of smoking sections may be an advantage to the smoker. Essentially the smoker is looking for a hassle free environment in which to smoke and a way to be less annoying to the non-smoker. However, in addition to this, the smoking section is an obvious visual cue to smoke. This holds true in public places, as well as the work environment. The Smoking Section signage, the presence of ash trays or another individual who is smoking, are all visual cues which contribute to the decision for the smoker to smoke.

Relating the social environment to product attributes pinpoints features of cigarettes which, if altered, would generate less criticism to the smoker from the non-smoker. These features relate to lingering cigarette smoke odor, sidestream odor, sidestream visibility and exhaled smoke.

R&D Response:

Our approaches to the issues which are developing from social acceptability range from Project Pact for improved indoor air quality to Paper Technology in reducing sidestream visibility. Cigarette development projects aimed at improving odor and visibility of sidestream smoke will be successful if cigarette products developed are acceptable subjectively to the consumers. The social benefits being developed in these programs are important, but consumers will not be willing to give up subjective satisfaction for these benefits.

SOCIAL TRENDS

Status:

The work of David Musto (Medical Historian, Yale University) points to the existence of what he calls a "Temperance Movement" in the United States that began in 1980 in response to the drunk driving issue. Musto claims that this is the third temperance movement in the U.S. over the past 200 years, and that these movements are approximately a generation apart (1850, 1920, 1980). All of the movements appear to

2026230223

be characterized by the recognition of a genuine social problem (the "whiskey glut" of 1850, the destructive effects of Saloons at the end of the 19th century, and drunk driving in 1980). However, these movements have in the past expanded from their roots in real problems to concerns that lead to a destructive effect on individual freedoms. An inability to support the necessary high level of public interest in the issues developed during a temperance movement ultimately leads to their decline. The effect of other people's actions on nonusers or nonparticipants has generally been an effective tool in maintaining public interest. It is inevitable, therefore, that the anti-smoking issue would turn to environmental tobacco smoke.

R&D Response:

R&D will continue to conduct qualitative research studies involving consumer needs, US demographics and statistical information to assess developments in social trends that may impact our business. In addition, R&D will continue to support historians and behavioral scientists who help our understanding of why people smoke and utilize history to predict future social patterns.

STRATEGIES OF ANTI-SMOKING GROUPS

Status:

Anti-smoking groups are now concentrating on ETS and its effect on the non-smoker. This approach sets up conflict between the smoker and non-smoker. The non-smoker (not necessarily an Anti) now becomes a factor in decisions made by the smoker. The legislative activity was as aggressive in 1989 as it was in 1988, if not more so. The issues continue to be smoking restrictions, restrictions on sampling, sales from vending machines, and establishing a minimum age of 18 for the purchase of cigarettes. In a different light, however, legislative activity was seen in the area of establishing smoking sections wherever no smoking areas are designated and legislation which prohibits discrimination in the work environment towards smokers.

A dramatic result of the anti-smoking groups' strategy was evident during two RJR launches (Uptown and Dakota). The uproar over RJR's attempt to target blacks and women led to the removal of Uptown from the test market.

Likely Scenario:

Activities by anti-smoking groups are likely to continue both in the social environment of the smoker, as well as on the legislative arena (state and federal governments).

2026230224

No alternate scenario is anticipated.

R&D Programs:

Paper Technology/Reduced Sidestream
Projects Sigma, Beta
Project Ambrosia
Project Pact

LEGISLATIVE ACTIVITY

Status:

A summary of the 1989 state legislative action is given in Table 24. The number and variety of considered legislative actions makes monitoring and counter actions very difficult. As part of the federal budget deficit reduction legislation passed October 27, 1990, excise tax increases on cigarettes will increase by four cents per pack on January 1, 1991, and another four cents per pack in 1993.

Also, government regulations could indirectly impact the way in which we do business. Examples include: forbidding consumer panel testing, government regulations affecting direct materials (e.g., dioxin in paper), and restricting exports. Legislation on the state level related to prohibiting sampling of cigarettes was passed in Utah. At this time there are no restrictions in consumer testing, and our position is to continue the evaluation of cigarettes with smokers after they have agreed to participate on our POL panels.

Likely Scenario:

We can continue to anticipate FTC involvement in the US cigarette marketplace to ensure that new products are properly classified as cigarettes and that advertising claims are justified with respect to product performance and analytical measurements. Tar and nicotine numbers printed on advertising are monitored, and appropriate adjustments are required of the manufacturers. The success of the cigarette export business is receiving attention by the anti-smoking groups with the intention of regulating cigarette exports. This regulation could be in the form of taxes or labeling consistent with requirements in the US market.

Continued pressure will be applied at all levels (federal, state and local) to further limit smokers rights and to pass increases in excise taxes. The federal budget deficit makes a cigarette excise tax increase very likely in 1991. A study of the industry response and impact of anti-tobacco legislation in Canada is discussed in Appendix K. This study is

Table 24

Summary of 1989 State Legislative Action

Total Tobacco Legislation (1989)

Considered:	668
1988	600

Cigarette Tax Increases (1989)

Considered:	41 States (27 States in 1988)
Passed:	16 States

Statewide Smoking Restrictions (1989)

Considered:	41 States (39 States in 1988)
Passed:	16 States

Cigarette Advertising Restrictions (1989)

Considered:	7 States
Passed:	None

Cigarette Sampling Restrictions (1989)

Considered:	15 States
Passed:	1 (Utah)

"Fire-Safe" Cigarette Legislation

Considered:	4 (Ma, Mn, NY, Wi)
Passed:	None

Will continue to be a major challenge over the plan period.
Federal legislation will take precedent.

2026230226

Table 24 (continued)

Summary of 1989 State Legislative Action

Sale of Cigarettes to Persons Under 18 Years of Age

Considered:	22 States
Passed	4 States

Vending Machine Legislation

Considered:	12 States
No Specific Legislation Passed	

Legislation Which Prohibits Discrimination Practices Toward Smokers

Considered:	10 States
Passed:	2 States

During 1990 five additional states passed employment discrimination legislation to protect smokers in employment.

2026230227

notable since anti-tobacco legislation in Canada is ahead of the US, and there is potential for a scenario similar to the one in Canada.

R&D Response:

Develop products and processes which address the concerns of the smoker and non-smoker.

Develop products which are news worthy to counteract advertising restrictions.

R&D Programs:

Paper Technology/Reduced Sidestream
Project Sigma/Beta
Project Ambrosia
Project PACT

Alternate Scenario:

State and local smoking restrictions and increases in excise taxes will diminish somewhat as more important national issues rise to the surface (e.g., environment, federal budget, world conflict).

REGULATION OF INGREDIENTS

Status:

The six major cigarette manufacturers in the United States have provided five composite qualitative ingredient lists to HHS as required by law. The next list is due in December of 1990. A report on ingredients from HHS is not expected during 1990. HHS Secretary Sullivan's position on whether it will occur in 1991 is uncertain at this time. In 1990, the six major cigarette manufacturers provided HHS with actual poundage for each ingredient used in 1989. This was done voluntarily. Two bills are pending in the US Congress that deal, in part, with ingredients. The Waxman/Whittaker and the Kennedy bills are proceeding through different parts of Congress. Both are still in the formative stages; however, some meetings/hearings have already taken place. Some of the significant issues which both proposed pieces of legislation deal with include advertising practices, sales to minors and non-tobacco ingredients. In addition, regulations on ingredient labeling and safety evaluation information could result. New federal administrative offices could be set up to regulate ingredients in cigarettes.

2026230228

Around the world ingredient regulations are emerging rapidly. Some deal only with warning labels. This is the case in the Netherlands and Norway. Canada requires ingredient/disclosure by brand. The following countries regulate non-tobacco ingredients in cigarettes: Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Yugoslavia, Egypt, South Africa, and Tanzania.

R&D Response:

An extensive review of ingredients has been underway at PM for the past four years. From 1986 to 1989 the number of ingredients utilized for all PM USA products has been decreased by 28%, while the tobacco industry has reduced the number of ingredients by only 19% in that same period of time. If labeling becomes necessary, a distinct advantage will be realized logistically with the fewest number of ingredients. Requests for additional information and/or elimination of ingredients may result in a significant impact on the resources of the Analytical and Biochemical Research Divisions as well as Flavor Development. In addition, work is ongoing to replace synthetic ingredients with natural ingredients where appropriate. Work to replace natural ingredients with synthetic ingredients may be warranted if the non-specific nature of most natural ingredients presents a problem and/or product quality is affected. Due to the need to maintain ingredient information proprietary for each brand, it is essential that this issue be handled at the industry level. Therefore, any problem that may surface with a tobacco industry ingredient would need to be addressed by all tobacco companies.

Our involvement in legislation and/or compliance activities will continue. Evaluation of ingredient safety and quality through consultants, literature and experimental investigation will remain at a high level of activity. The development of new products which meet or exceed pending or proposed legislation remains a strong area for R&D involvement.

R&D Programs:

- Ingredients
- Flavor Specifications
- Alternate Flavor Systems

2026230229

REGULATION OF SMOKE CONTENT

Status:

Government regulations with respect to labeling requirements and limitations on tar, nicotine and CO levels continue to emerge in international markets. Japan now requires tar and nicotine labeling on product packs. Other regulations are listed in Table 25.

Likely Scenario:

Regulations by foreign governments can be expected to increase. These restrictions will significantly impact the direction of future product development strategies. In addition, the possibility of U.S. federal government restrictions on export cigarettes exists.

R&D Program Response:

Compliance with regulations and restrictions.

New product development programs which utilize new technology that will assist in achieving compliance with all regulations:

- Project ART
- Filtration Research
- Paper Technology/Reduced Sidestream
- CO Catalysts Studies

IGNITION PROPENSITY

Status:

Senators Moakley and Boucher reached a compromise on a fire safety bill. This bill is a significant improvement over previous drafts in that it does not provide for a performance standard. The bill, called the Fire Safe Act of 1990, was signed into law and will require the following:

Consumer Product Safety Commission (CPSC) directs National Institutes of Standards and Testing's (NIST) Center of Fire Research to:

2026230230

Table 25

Government Regulation of Tar, Nicotine and CO

<u>Country</u>	<u>Printed Parameters</u>	<u>Maximum Allowed Deliveries</u>
Bahrain	Tar, SN	Tar = 12mg SN = 0.8mg
Kuwait	Tar, SN	Tar = 12mg \pm 20% SN = 0.8mg \pm 20%
Oman	Tar, SN	Tar = 12mg SN = 0.8mg
Qatar	Tar, SN	Tar = 15mg SN = 1mg
Saudi Arabia	Tar, SN	Tar = 12mg SN = 0.8mg
Singapore	Tar Banding	Tar = 15mg \pm 15% SN = 1.3mg \pm 15%
Hong Kong	Tar Banding	None
Japan	Tar, SN	Printed Tar \pm 20% Printed SN \pm 20%
Australia	Tar, SN, CO	Voluntary Code: Tar = 14mg SN = 1.4mg CO = 20mg

SN = Smoke nicotine.

Tar Banding = Language specified for various tar ranges.

2026230231

Develop a standard test method to determine ignition propensity;

Compile data for cigarettes using the developed test method; and

Conduct laboratory studies on computer modeling of ignition physics to develop valid user-friendly predictive capability.

CPSC will:

Initiate study to collect baseline and follow up data about characteristics of cigarettes, products ignited and smokers involved in fires.

Health and Human Services and CPSC will:

Develop information on changes in toxicity of smoke and resultant health effects from modified cigarettes and societal costs of cigarette-ignited fires.

Advisory Group - Same as Tobacco Study Group from the 1984 Cigarette Safety Act will:

Hold hearings to develop information to carry out its functions; and

Advise and work with CPSC and NIST.

Reports required once funds are appropriated for this bill:

13 Months -- CPSC and Advisory Group Report to Congress.

25 Months -- CPSC and Advisory Group Report to Congress.

36 Months -- Final Report by CPSC and Advisory Group to Congress.

Likely Scenario:

This federal legislation will take precedence over state legislation and halt state initiated legislation on this issue. The result of this is positive, since a more uniform approach to the issue is assured.

2026230232

Later in the plan period ignition propensity issues could take center stage and new legislation requiring testing would require a rapid response in terms of introducing new products which meet these new standards.

R&D Response:

The development and testing of low ignition propensity model cigarettes will continue during the plan period. Interactions will continue to occur between industry and governmental officials regarding this legislation.

R&D Programs:

Project Tomorrow
Paper Technology Program

ENVIRONMENTAL ISSUES

Status:

National and international focus continues to shift from emphasis on controlling and treating industrial emissions and discharges to preventing their generation. The increases in federal and state regulations and public awareness of the environment will intensify during the plan period. The risks of not responding appropriately are enormous. They will affect our manufacturing flexibility and the public's perception of our status as a responsible corporate citizen.

Congressional changes in this area (e.g., Clean Air Act) will be costly to both the industry and the general citizen. As landfills continue to decline in terms of numbers, capacity, and the materials accepted for disposal, costs will rise dramatically. As part of any plan for the future of waste management, recycling of waste and increased use of recycled materials will intensify.

PM USA is currently developing and implementing a five-year plan dealing with the significant issues in the environmental area. Not only do we comply with emission/disposal regulations where they exist, but also we try to foresee the direction in which new regulations are going and prepare for their implementation. These efforts will require additional resources as this entire area of environmental concern moves through this plan period.

2026230233

Likely Scenario:

More stringent regulatory standards will be set, greater public awareness and activism will be apparent, and industrial waste management programs will be placed under greater scrutiny.

Alternate Scenario:

Restrictive legislation will come quicker than anticipated at both state and federal levels so as to severely limit our manufacturing flexibility. Businesses which supply many of our materials will be unable to meet tolerance levels for important criteria standards, or in meeting these standards the quality and machinability of these products will be sufficiently different so as to adversely affect our manufacturing efficiency.

R&D Response:

R&D will participate in and provide both guidance and analytical expertise in support of the proposed Environmental Health and Safety Five-Year Plan. A copy of the draft of this plan is in Appendix L. Analytical Research and Biochemical Research will continue to provide laboratory support for non-routine evaluations. R&D will continue to facilitate the operations of the Materials Evaluation Program directed from Quality Assurance with both analytical support and toxicological expertise. The use of R&D expertise is dedicated towards the continued support and initiation of new processes/products which in the production mode comply with all current environmental regulations, e.g., alcohols (Project Grain), phosphate and nitrogen waste discharge (Cast Leaf Program), water column nicotine disposal, volatile organic compounds (VOCs), liquid flavors on RL, CO₂ (New Expanded Tobacco Program), solid waste utilization and recycling (sludge), and ETS management (Project PACT). The use of environmentally neutral packagings and other materials that would allow us to produce quality products is an area being studied, e.g., recycling of paper wastes, use of recycled materials, and "biodegradability."

R&D Programs:

New Expanded Tobacco Program

- Minimize CO₂ and loss of volatile organic compounds.

Cast Leaf Program

- Minimize phosphates and nitrates in the process effluent.

2026230234

Liquid Flavors

- Minimize size thickening to eliminate need for solid waste disposal.

Volatile Organic Compounds (VOC)

- Minimize loss of VOCs in our processes.

Nicotine Disposal

- Develop methods of handling and dealing with nicotine disposal.

Phosphine Fumigation

- Eliminate need for phosphine fumigation by implementing Kabat® treatment.

Waste Disposal

- Minimize solid waste disposal (sludge recycling).

ETS/Project PACT

- Develop technology that will permit smokers and non-smokers to inhabit smoking areas without irritation to either.

PACK TAMPERING

Status:

An incident of product tampering is feasible and would have major impact on the company. Should such an event occur, a crisis management team would direct the company's response. R&D would be called on for factual information about the chemical nature of the tampering and its impact on a smoker.

R&D Programs:

Currently R&D maintains an active materials evaluation program and supports the customer complaint committee. Support of these activities requires the capability of evaluating the impact of foreign additives to cigarettes.

With regard to the development of tamper evident flexible packaging, R&D maintains an awareness of vendor activity. Since packaging is an issue facing all consumer products companies, this particular issue affords much opportunity for synergy among PM Companies.

2026230235

TECHNOLOGICAL FACTORS

EXTERNALLY DEVELOPING TECHNOLOGIES

Status:

Areas of science and technology which are developing rapidly in the technical community *external* to Philip Morris and which will impact our operations during the Five-Year Plan period are discussed in Appendix D. These items were identified by the R&D Principal and Associate Principal Scientists/Engineers. More detailed discussion was then provided by senior R&D personnel familiar with each particular area.

Likely Scenario:

New technologies are essential to the development of new products and processes which address the areas discussed in this section on future factors. These technologies are important not only to the creation of the product or process, but also to the proprietary position of the company in the industry. Because of the importance in recognizing and evaluating new technologies and their applicability to our product, technology assessment must be accomplished by PM R&D personnel working with outside resources. Therefore, the development and maintenance of outside contracts and resources is essential in maximizing our utilization of technological advances. Within the plan period, important technological advances which would generate a distinct product advantage are likely.

R&D Programs:

The Technology Assessment Group functions to recognize (with assistance from all R&D professionals) and evaluate technologies which could be utilized to benefit our position in the industry. An Action Plan is outlined in Appendix P on a new technology review mechanism.

STRATEGIC TECHNOLOGIES

Status:

During the first and second quarters of 1990, the Principal and Associate Principal Engineers and Scientists met as a committee to define the science and technology needs of the current R&D programs. The process employed is summarized below. The strategic needs which should be considered during R&D planning processes are detailed in Appendix E.

2026230236

Information was gathered by teams who met individually or in small groups with the coordinators, project leaders and/or senior staff of each major R&D program. The objective during these discussions was to determine:

1. Program Needs What does the program need to accomplish in order to meet its goals?
2. Science & Technology Needs What specific technology or areas of scientific investigation are needed to support each program need?
3. Status What is the status of each of the above science and technology areas at PM R&D and elsewhere?

Each team prepared a written outline of its findings. These materials were reviewed by the Principal and Associate Principal Staff as a group. The group reached a general understanding of each program need, added science and technology items which it felt were important and, finally, selected the specific items which it believed:

1. Were of strategic importance to the major R&D programs, and
2. Were not well established at R&D.

The group also considered the availability of each strategic item in the external (to PM R&D) world. These were classified as (A) readily available outside, (B) emerging or developing outside, or (C) not available (to any significant extent) outside. It should be noted that availability outside of R&D generally does not eliminate the need for internal efforts to develop or adapt the item to our needs.

The "Strategic Technology Lists" are presented in Appendix E.

Table I lists the strategic science and technology items by Major R&D Programs.

Table II lists, by science or technology item, the items which are important to two or more R&D Major Programs.

The two broad areas of research mentioned most frequently were "Chemical Senses" and the "Chemistry and Physics of Smoke Formation." Chemical Senses research would encompass the development of a fundamental understanding of those physical/chemical and biological system interactions that result in a favorable subjective response to the

product. The senses of primary interest include taste, olfaction, feeling (e.g., trigeminal) and vision. The role of cognitive factors (e.g., consumer expectations) as they impact these senses is also of interest. More specific topics would include single compound design, prediction of response to mixtures of compounds, sensory receptor mapping, experimental work on the cognitive components of perception, study designs, statistical testing and hypothesis evaluation. The Chemistry and Physics of Smoke Formation involves the basic physical and chemical processes by which tobacco is transformed (through pyrolysis, combustion and condensation) into smoke. Each of these areas was perceived by the Program Coordinators and by the Principal and Associate Principal Staff as having significant potential for long-term contributions to the R&D programs.

Likely Scenario:

The continued financial success of our business will rely to an ever increasing degree upon our understanding of the chemical senses, combustion research and other strategic technologies and the application of this information to the design of new products. The consumer's demands or government's requirements for new, nontraditional products (e.g., low sidestream, decreased ignition propensity, non-burning article, novel aromas) cannot be met solely with the tools which we have successfully used in the past. Successful development of novel products demands additional, innovative approaches.

R&D Response:

Strategic technologies will be identified and evaluated through a continuing process like the one outlined in Appendix P. Technologies determined to be important to our future success in any given program area will be handled in one or more of the following ways:

1. The Technology Assessment Group will evaluate and monitor the technology;
2. The technology will be incorporated into our basic research support area, and internal resources will be allocated to the technology;
3. A specific technology may become a major program, depending on the number of resources allocated and the stage of implementation the technology has toward new product development.

A discussion of PM R&D implementation of the Chemical Senses and Combustion Physics and Chemistry technologies appears in the Implementation Section of this plan.

INTERNAL ENVIRONMENT FACTORS

TECHNOLOGY MANAGEMENT

Status:

The objective of technology management is to develop the appropriate resources to provide an environment in which technology-driven products can be developed to grow our business. Technology management has been identified as an internal issue, as the management of technology and technological personnel will be a key factor to our success in the future.

Likely Scenario:

New technologies will develop rapidly, and technology assessment and evaluation methods will need to keep pace with the change. Personnel skill needs will also change rapidly, making highly trained worker skills obsolete in a relatively short period of time. Adequate training programs will need to be instituted to maintain skill competence in rapidly changing areas. In addition, utilization of outside sources of technology will need to be maximized to obtain key technologies without having to internalize expertise in the area. Intellectual property rights will become more important as novel technology-driven products become commercialized. Technology transfer involving effective communication among Research, Development, Engineering, Marketing, and Manufacturing will be essential to the successful commercialization of these novel products. Finally, as is widely publicized, the lack of availability of trained scientists in future years is expected to become a major issue for the country and the company. In certain disciplines, competition may be fierce, and defense-related skills may be preferentially acquired by the government.

R&D Response:

The Technology Assessment group and senior technical staff play a key role in the identification and evaluation of key technologies. Our utilization of external resources has dramatically increased in the past few years, and mechanisms are in place to deal with these relationships effectively. External resources have included suppliers, professional services, universities, consultants, purchased services, and synergy with other PM Companies. In order to handle these relationships and our intellectual property rights, another patent attorney has been added to our corporate legal staff. Action plans relevant to technology transfer are discussed in the Implementation Section and in Appendix P. These action plans include technology evaluation mechanisms,

2026230239

recruiting and science education commitments, personnel training, and communication mechanisms important to technology transfer.

R&D RESOURCES

Likely Scenario:

All likely scenarios indicate a need for an increase in R&D effort. Therefore, if a constant head count is maintained, R&D's ability to implement the plan and address these future factors will be hampered. In addition, the mix of skills of the work force will be required to change in order to develop technologies for future products. Opportunities, including continuing education, broadening reassignments, and additional training, will need to be made available to new and existing employees in order to obtain and maintain the work force necessary to carry out the plan in future years. Specific issues include the availability of individuals trained in certain technologies, as well as the availability of US citizens to handle sensitive defense-related technologies. In addition, it is highly unlikely that existing facilities and equipment will be able to adequately support novel product development or eventual manufacturing.

R&D Response:

Address needs for additional resources by first examining priorities and shifting personnel when feasible. Increase head count in appropriate areas after careful consideration of all possible alternatives. Determine the relative advantages of carrying out a specific piece of research or development work utilizing outside or in-house resources. Outside resources can be used advantageously when a) the project will be of short duration; b) it would require too great an investment in either facility or people resources to conduct the project in-house, or c) a feasibility study is necessary before a decision can be made as to whether or not we intend to seriously commit resources to a program.

Develop action plans to address the projections of a changing work force and the potential shortage of technical personnel with programs designed to attract and motivate employees and improve overall efficiencies. For example, a post-doctoral program at R&D would allow individuals who were recently trained in a specific technical area to transfer and apply that technology to R&D issues on a short-term basis. This would have several advantages. First, R&D would not have to make a long-term commitment to an individual in order to obtain key technical input. Secondly, the program would support and encourage individuals with skills in needed areas, as well as provide a trial period for the evaluation of potential permanent employees.

2026230240

Design and construct necessary equipment and facilities as needed. An R&D facility plan is discussed in the Implementation Section and in Appendix P.

CAPACITY

Status:

In 1990, ET capacity was determined to be a significant issue (Figure 22). Plans to add capacity at Cabarrus will satisfy ET capacity needs during this plan period. Additional RCB capacity is also an issue during the plan period. R&D's Cast Leaf program is designed to address capacity needs as well as environmental and flexibility needs associated with the process. Other R&D activities in this area will include consolidation of product components and primary improvement work designed to simplify primary processing and enhance flexibility.

R&D Program:

- Cast Leaf Program
- Consolidation of Product Components
- Primary Improvement

MANUFACTURING SUPPORT

Likely Scenario:

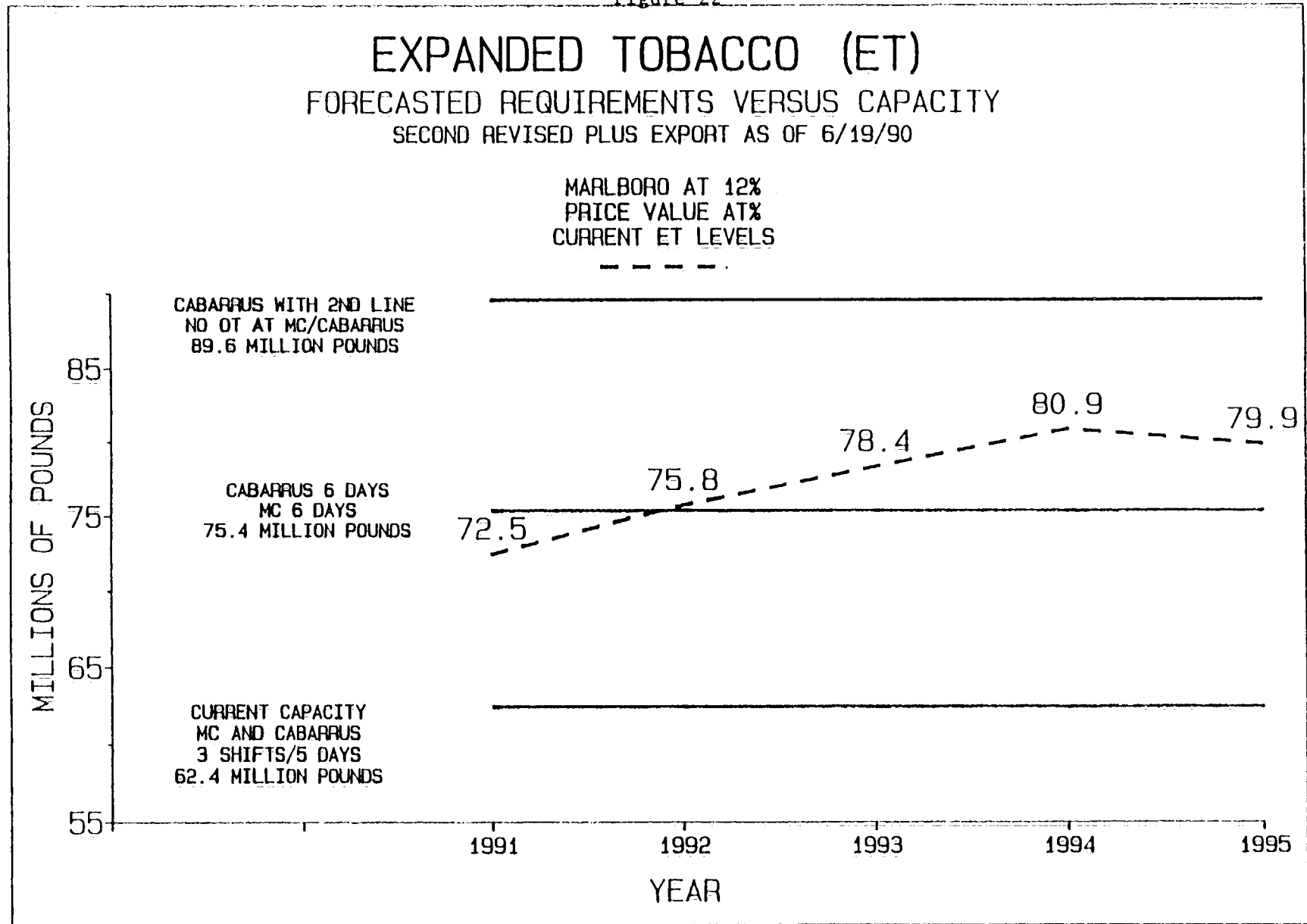
The new manufacturing equipment which can achieve speeds up to 10,000 cigarettes/minute will require R&D support in order to deal with deficiencies in materials. Certain components, particularly papers and adhesives, may not perform optimally at these high speeds. New technologies (e.g., supercritical extraction) and products could increase the need for R&D support of manufacturing. The achievement of PM USA's plan volume objectives will be dependent on a significant increase in brands and new products using new technologies and manufacturing techniques.

R&D Response:

Continue programs which address manufacturing support. These include areas of paper technology, adhesives and optical processing. Develop joint programs with Manufacturing and Engineering to address needs of the future.

2026230241

Figure 22



ETCR-90

2026230242

RAW MATERIAL SUPPLY

Status:

Situations could develop which would result in: (1) shortages of raw materials; (2) necessary modifications to raw materials; (3) key suppliers going out of business; (4) unfavorable business relations with suppliers.

Likely Scenario:

New products and processes continue to be an essential part of our business. The need for new technologies and materials increases the importance of the maximum utilization of our suppliers and their resources. In addition, with increasing emphasis on environmental concerns, suppliers are finding it necessary to modify materials to meet PM and/or government restrictions. Some suppliers may go out of business if unable to meet the new requirements.

The EPA has tightened restrictions on the levels of volatile organic compounds which can be released into the atmosphere. This has resulted in a push toward waterborne lacquers and inks in order for ink suppliers to comply with regulations. This new chemistry in printing would require substantial development work for analytical and subjective acceptability as well as machinability.

The Council of Northeastern Governors (CONEG) legislation currently designates acceptable limits for 4 heavy metals. It is expected that the number of metals that will be targeted by this legislation will increase. This requires new formulations of inks which have to be reviewed by purchasing and R&D as well as development of new methods to analyze for the metals.

Due to residual solvents which remain after printing, Purchasing Technical Services in conjunction with Packaging Studies has developed a list of solvents which cannot be used, and threshold limits for others. Further additions to this list based on environmental, toxicological or subjective acceptability would also require suppliers to develop new formulations.

Environmental concerns are requiring paper suppliers to make changes to papermaking processes in order to reduce dioxin levels. This again requires chemical, subjective and machinability testing for approval of new paper products.

Increasing pressure to use higher levels of recycled materials in packaging will require the evaluation of its effect on manufacturing flexibility. Pending federal legislation on

the issue of natural versus man-made components will force further scrutiny of the flavors which are used in our products. Specification of all ingredients poses a proprietary risk for both the flavor suppliers and PM. In addition, toxicological studies may result in removal or substitution of flavor components which are unacceptable. Finally, consolidation of companies in the flavor industry and thus, changing management, could compromise our available resources, especially if new management decisions do not support the tobacco industry.

The largest tobacco seed supplier, Northrup King, recently eliminated their tobacco research and breeding work with tobacco, leaving two minor suppliers, Spiegth and Richard Gwynn Seed Co., that continue research in this area.

R&D Response:

Develop proprietary products and technology to facilitate and control our position and ensure exclusivity for these products from our suppliers.

Complete the establishment of specifications for incoming materials (flavors, papers, adhesives, packaging materials and packaging inks).

Maximize utilization of suppliers and resources. This may result in reducing the number of suppliers we use for a specific type of material (e.g. adhesives).

Keep abreast of pending legislation and environmental concerns which our suppliers must comply with. Expand existing materials evaluation and specification programs as necessary to monitor changes in raw materials.

Evaluate the feasibility of using vendors who use recycled materials (e.g. packaging).

PRODUCT QUALITY

Likely Scenario:

As the market volume continues to grow in the price/value segment, product quality can become an essential differentiating factor. With three price tiers now a reality, quality must be judged against competitive products in the same price range, and our strategy must be to be superior within each tier. Cost cutting measures should be achieved through the use of new technologies and/or processes which do not significantly impact product quality. An example involves our work with offset printing. Offset printing has several advantages, including lower cost and higher quality. In addition, offset printing is good for short runs, thereby providing a flexibility advantage. However, materials

utilized in offset printing impart a negative subjective effect on our products when brought in close proximity. Currently, an investigation is being undertaken on the chemical components.

R&D Programs:

- Operations Support
 - Adhesive Specifications
 - Offset Printing
 - Materials Evaluation
- Optical Processing
- Processing Sensing & Control
- New Expanded Tobacco
- Marlboro Standardization

COST EFFICIENCY

Status:

As indicated in the PM USA Five-Year Plan, cost efficiencies should be maximized throughout the Company. New products, new technologies and the large number of issues facing the Company in the foreseeable future all may threaten to increase the cost of doing business. R&D programs are generally conducted in a manner that maintains PM's proprietary position. While this strategy may increase initial R&D investment, and therefore R&D cost, "ownership" of important product and process technology can certainly lower the overall cost to the Company by allowing us to exercise some control over the vendor as well as allowing us to "spin off" or license such technology if it is in our interest to do so.

R&D Response:

Continue to consider cost efficiency a major factor in all R&D endeavors.

Continue to focus on programs which will improve our proprietary positions and thereby provide a more cost-effective means of doing business.

Focus resources on issues which may adversely affect the cost efficiency of the Company (consolidation of product specifications, alternate tow and paper fibers). For example, developing proprietary methods of dealing with environmental issues will improve our ability to do business in a cost-effective manner when faced with environmental restrictions and regulations.

2026230245

OBSOLESCENCE OF THE CURRENT PRODUCT

Status:

In order to address consumers' and potential consumers' concerns while dealing with a declining market, radically new products will be essential. Clearly, there has been an extensive amount of activity in this area. In addition to products such as Next, Premier, Chelsea, Horizon, and Superslims, extensive patent activity is evident by the huge volume of patents in smokeless cigarette devices, inhalers, aerosol dispensers, release compositions and transdermal delivery patches. Abstracts of patents issued in these areas from 1/1989-8/30/90 are compiled in Appendix M. If products such as nicotine chewing gum and nicotine patches are used as cigarette substitutes by a significant number of our customers, the loss in sales could not be regained by marketing a conventional product.

Likely Scenario:

Obsolescence of our current product is not likely within the plan period, however, technological breakthroughs and innovative products are highly likely in the next ten years. Our efforts to develop innovative new products should receive high priority.

R&D Programs:

- Project Beta
- Project ART
- Paper Technology/Reduced Sidestream
- Combustion Research
- Aerosol Research
- Chemical Senses

OBSOLESCENCE OF CURRENT PROCESSES

Status:

Tobacco processing operations have changed very little over the years in which significant changes have been made in production and product requirements.

2026230246

Likely Scenario:

Environmental issues, new products requiring radically different processes, and the need for manufacturing flexibility will lead to an increase in process development activities.

R&D Programs/Response:

The New Expanded Tobacco Program has been established to develop expansion technology and associated processing for the production of expanded tobacco materials having the physical and subjective characteristics required to support future product needs. Immediate goals are to reduce tobacco degradation and to improve processing uniformity of the existing DIET process. These improvements will be incorporated in the design of future DIET process installations.

A program has been initiated for the development of cast leaf. The program will address the following PM USA strategic business requirements: 1) reconstituted sheet capacity through the 1990's; 2) environmental limitations of the current BL process; 3) manufacturing flexibility to meet future product needs; and, 4) support of PM International needs for reconstituted sheet technology.

A process development need has been identified for the development of new primary processing technology to meet future product mix requirements with maximum achievable quality and yield.

DEPENDENCE OF R&D ON SUPPLIERS

Status:

Experience has shown that vertical integration of businesses for the manufacture of raw materials/supplies has not performed as expected. This concept impacts negatively on product flexibility and quality. Most of our materials and supplies are purchased and a significant amount of reliance is placed on the suppliers. The selection of suppliers should be based on sound procedures for identifying and qualifying the supply sources.

A significant amount of progress has been made in this area. However, situations could develop which would result in: 1) shortages of raw materials; 2) key suppliers going out of business; and, 3) unfavorable business relations with suppliers.

2026230247

Likely Scenario:

As new products and processes become an essential part of our business, new technologies and materials will be required which will increase our need to maximize our utilization of suppliers and their resources.

R&D Response:

Develop proprietary products and technology to facilitate and control our position and ensure exclusivity for these products from our suppliers.

R&D Programs/Response:

Identify and establish close relationships with high quality companies and other sources for providing the expertise and/or materials needed to support R&D programs.

Materials Evaluation
Flavor Specifications
Adhesive Specifications
Monogram Inks

SUMMARY OF FUTURE FACTORS

The future factors affecting the business are many and varied. Factors discussed in this section are summarized below:

Marketplace Factors:

Key marketplace factors that impact future new product development are:

- Dynamic market (new segments)
 - older smokers
 - price/value
- Declining market
 - complete brand families
 - value-added products
 - maximize PM share in underrepresented segments: (menthol, ultra low tar, price/value)
- Increasing export markets and volume

2026230248

- continue growth
- create new segments in international market (Next; Menthol-Japan; ultra low tar-Japan)
- Product changes due to Government Regulations
 - ignition propensity
 - ingredient regulations
 - smoke content regulations/labeling
 - smoking restrictions (low sidestream products, room ventilation technology)
- Technology-Driven Products
 - low tar with enhanced flavor
 - nicotine segmentation
 - sidestream reduction
 - sidestream odor reduction/modification
 - non-traditional smoking articles

Social/Political Factors:

Key social/political factors affecting the industry include:

- Perceived health concerns
 - non-traditional smoking articles
 - Surgeon General's Report
 - ETS
 - scientific/toxicological research toward the development of a causal link
- Social Acceptability
 - smoking restrictions
 - designated smoking sections
 - ETS/sidestream smoke
 - social trends
 - strategies of anti-smoking groups
- Legislative Activity
 - quantity
 - variety (taxes, smoking restrictions, advertising restrictions, sampling restrictions, "fire-safe," sale to minors, vending machine legislation, workplace discrimination)
 - factors affecting activity (social trends, anti-smoking group strategies, potential distraction by other national issues).

2026230249

- regulation of ingredients
- regulation of smoke content and constituents
- ignition propensity
- Environmental Issues:
 - emissions (CO₂ , VOCs)
 - process effluents (phosphates and nitrates)
 - waste disposal (liquid flavors, nicotine disposal, recycling)
 - pesticides/fumigations (Kabat® to replace phosphine)
 - ETS (room ventilation systems, product modifications)
- Product Tampering
 - crisis management team/R&D support
 - use of company synergy on packaging

Technological Factors

Technological factors that will impact our business include:

- Externally developing technologies
 - large number
 - rate of development
 - R&D technology assessment function
- Strategic technologies
 - identification
 - needs of R&D programs
 - implementation methods

Internal Environment Factors

A number of internal factors will impact our business during the plan period. These are:

- Technology Management available
 - rate of change in technologies
 - personnel skills (training)
 - availability of skilled workers (science education support)
 - technology transfer/product commercialization

2026230250

- R&D Resources
 - people/skills
 - facility
- Capacity
 - production capacity limitations
- Manufacturing Support
 - high speed equipment
 - commercialization of new technology-driven products
- Raw Material Supply
 - shortage potential
 - modifications to materials
 - suppliers relations
- Product Quality
 - value-added
 - cost management
 - product integrity
- Obsolescence of Current Product/Processes
 - intellectual property rights
 - new product segments
 - novel smoking articles
 - environmental, quality, capacity, cost and flexibility needs driving new process development
- Dependence on Suppliers
 - develop proprietary position
 - establish productive relations

2026230251

G. R&D ISSUES

From the analysis of future factors, a number of issues have been identified which are expected to have the most impact on R&D during the plan period. These are:

PRODUCT INTEGRITY
PRICE/VALUE
HEALTH PERCEPTION
SOCIAL ACCEPTABILITY
GOVERNMENT REGULATIONS
TECHNOLOGY MANAGEMENT

The objective relevant to each issue and pertinent R&D programs are listed below:

PRODUCT INTEGRITY

Objective:

Address situations which impact all aspects of product quality.

R&D Programs:

Operations Support
 Quality Assurance Support
 Tobacco Processing Support
 Production Support
 Miscellaneous Support
Optical Processing
New Expanded Tobacco
Cast Leaf Process
Project Natural
Ingredients
Menthol
New Packaging Concepts
Process Development Studies
Flavors
Consumer Testing Research

2026230253

VALUE-ADDED PRODUCTS

Objective:

Develop products which are perceived to be of high value (financial, psychological, sensory) by the consumer.

R&D Programs:

- Domestic Product Development
- International Product Support
- Project ART
- Reduced Sidestream/Paper Technology
- Project Ambrosia
- Project Natural
- Low Tar/High Flavor
- Menthol
- Consumer Testing Research

Other long-term programs that provide key product advantages to the consumer.

HEALTH PERCEPTIONS

Objective:

Develop products which address consumer health perceptions.

R&D Programs:

- Low Tar/High Flavor
- Selective Filtration
- TSNA
- LBA
- Combustion Chemistry and Physics
- Project Beta
- CO Reductions

2026230254

SOCIAL ACCEPTABILITY

Objective:

Develop products that address the social issues facing our products.

R&D Programs:

- Reduced Sidestream/Paper Technology
- Project Ambrosia
- Basic Research (Aerosol Research, Flavor Research)
- Project PACT
- Project Natural
- Project Beta

GOVERNMENT REGULATIONS

Objective:

Meet or exceed government regulations facing our business.

R&D Programs:

- Project Tomorrow
- Ingredients
- Reduced Tar and Nicotine/International
- Environmental Five-Year Plan

TECHNOLOGY MANAGEMENT

Objective:

Develop the appropriate resources to provide an environment in which technology-driven products can be developed to grow our business.

R&D Actions:

- Technology Assessment
- Personnel Skills Mix/Change/Availability
- Training
- Utilize External Resources/Suppliers

2026230255

Protect Intellectual Property Rights
Synergy
Technology Transfer

2026230276

R&D Strategic Goals

2026230257

H. R&D STRATEGIC GOALS

R&D's Strategic Goals are based on PM USA's five-year goals, an analysis of the future factors which may significantly impact the attainment of those goals, and the key issues facing R&D.. R&D's Strategic Goals for the 1991-1995 Plan period are:

1. **Support** the company's present product lines and business operations.
2. **Grow** the business **short-term** with new/optimized products and processes for both domestic and international markets.
3. **Address** consumer wants and external requirements with new technology-driven products.
4. **Grow** the business **long-term** by identifying, evaluating, developing and implementing new technologies potentially applicable to future products and business needs.

The Strategic Goals and the R&D Programs (current and projected) that support each goal are outlined in Tables 26-29. Current and projected resource allocations are given for each program in each plan year. The rationale for the projected resource allocations for each program is outlined in the next section. A break down of the resources allocated to each program is given in Appendix N, and divisional resource allocations to each program are given in Appendix O.

In certain cases, an R&D program may support more than one Strategic Goal. For example, Project Beta would address consumer wants and external requirements with technology-driven products, as well as grow the business in the long-term by implementing new technologies. Programs that apply to more than one Strategic Goal are indicated in Tables 26-29 by the percentage of the resources applicable to the indicated Strategic Goal shown in parenthesis next to the name of the program. In such cases, the resources devoted to the program were allocated to the given Strategic Goal by the percentage indicated. A discussion of the main components of each Strategic Goal are outlined below.

Strategic Goal Number 1 - Support The Company's Present Product Line and Business Operations.

As can be seen in Table 26, all of the programs that fall into this Strategic Goal, except the Primary Improvement are locally in place. However, the emphasis of certain

2026230258

Table 26
Strategic Goal Number 1

Support the Company's Present Product Lines and Business Operations

Program	Resource Allocations					
	Year					
	1990	1991	1992	1993	1994	1995
Operations Support	95.6	87.5	96.3	104.8	109.8	115.5
Optical Processing	8.0	8.4	8.6	8.4	9.8	9.7
New Expanded Tobacco	32.1	49.0	37.4	26.8	18.3	16.3
Cast Leaf Program	13.0	18.3	28.1	26.1	22.0	20.9
Project ART	67.5	48.9	34.7	29.1	24.9	16.9
Consumer Testing (33%)	0.4	0.4	0.4	0.4	0.4	0.4
Meas. and Sensing of Physical and Chemical Char.	3.5	1.3	1.3	1.3	1.3	1.3
Computing Systems (50%)	1.9	1.3	1.3	1.4	1.4	1.4
Process Plant Support	2.6	7.0	5.8	7.7	9.7	9.8
Primary Improvement	0.0	5.3	4.0	2.7	3.1	4.0
TOTALS	224.6	227.4	217.9	208.7	200.7	196.2

2026230259

Table 27
Strategic Goal Number 2

**Grow the Business Short-Term With New Optimized Products and Processes
for Both Domestic and International Markets**

Program	Resource Allocations					
	Year					
	1990	1991	1992	1993	1994	1995
Reduced SS/Paper Technology (33%)	16.9	16.3	16.0	16.7	15.9	14.9
Low Tar/High Flavor (50%)	6.5	7.0	6.1	6.8	6.6	6.6
Filtration Research	11.7	9.4	11.6	11.8	11.8	11.7
Domestic Product Development	81.3	81.2	84.1	90.2	90.2	94.6
International Product Support*	64.7	64.6	67.5	70.5	72.2	74.4
Menthol	8.3	7.8	8.1	7.4	7.0	7.6
Project Ambrosia/Ashtray Odor (50%)	5.1	5.5	5.7	5.0	3.0	1.4
New Packaging Concepts	0.3	0.3	0.3	0.3	0.3	0.3
Flavors (50%)	4.2	3.8	4.1	4.1	4.4	4.8
Consumer Testing Research 33%	0.4	0.4	0.4	0.4	0.4	0.4
TOTAL	199.4	196.3	203.9	213.2	211.8	216.7

*Includes 41 QZ personnel

2026230260

Table 28
Strategic Goal Number 3

Address Consumer Wants and External Requirements With
New Technology-Driven Products

Program	Resource Allocations					
	Year					
	1990	1991	1992	1993	1994	1995
Project Tomorrow	10.6	20.5	23.7	26.1	29.1	21.1
Project Sigma/Beta (50%)	24.8	19.7	22.7	24.6	25.2	21.9
TSNA	26.6	24.6	24.4	18.4	16.0	16.7
LBA	19.9	14.9	13.0	13.1	17.1	17.1
Reduced SS/Paper Technology (33%)	16.9	16.3	16.0	16.7	15.9	14.9
Project Ambrosia/ Ashtray Odor (50%)	5.1	5.5	5.7	5.0	3.0	1.4
Project PACT	3.9	3.6	0.8	0.5	0.3	0.0
Project Natural	2.1	2.0	1.7	0.9	0.9	0.9
Ingredients	2.8	3.7	3.8	4.1	4.1	4.1
Reduced Tar and Nicotine Intl.	2.4	2.3	2.2	2.2	2.2	2.1
Aerosols (50%)	3.4	3.7	3.7	3.7	3.7	4.4
TOTALS	118.5	116.8	117.7	115.3	117.5	104.6

2026230261

Table 29
Strategic Goal Number 4

Grow the Business Long-Term by Identifying, Evaluating, Developing, and Implementing New Technologies Potentially Applicable to Future Products and Business Needs

Program	Resource Allocations					
	Year					
	1990	1991	1992	1993	1994	1995
Project Sigma/Beta (50%)	24.8	19.7	22.7	24.6	25.2	21.9
Reduced SS/Paper Technology (33%)	16.9	16.3	16.0	16.7	15.9	14.9
Low Tar/High Flavor (50%)	6.5	7.0	6.1	6.8	6.6	6.6
Selective Filtration	1.9	3.2	5.6	6.4	6.3	9.0
Combustion Research	0.8	1.5	4.1	4.2	4.1	2.9
Flavors (50%)	4.2	3.8	4.1	4.1	4.4	4.8
Aerosols (50%)	3.4	3.7	3.7	3.7	3.7	4.4
Selective Separations	3.4	3.8	4.7	6.6	12.6	21.9
Consumer Testing Research (33%)	0.4	0.4	0.4	0.4	0.4	0.4
Chemical Senses	2.6	3.0	5.9	9.2	12.3	13.6
Biological	4.4	7.0	8.1	8.2	8.8	9.5
Computing Systems (50%)	1.9	1.3	1.3	1.4	1.4	1.4
Basic Analytical Research	2.1	2.6	2.6	2.7	3.3	4.0
Plant Tissue Culture	0.0	1.8	2.6	2.7	2.7	2.7
Biochemical Processing	0.0	0.0	0.0	1.3	2.7	2.7
Project Alpha	0.0	0.0	0.0	0.0	0.0	6.7
TOTALS	73.3	75.1	87.9	99.0	110.4	127.4

2026230262

programs has changed and/or will change over the plan period. For example, the components of Operations Support for 1990 (Table 5) have been changed (Table 30) to reflect the completion of certain projects (Flavor Specifications and Project Warhol) and the addition of others (Adhesives, Cigarette Monitoring, Monogram Inks, Packaging Inks and Solvents, Engineering Studies, Cooperative Leaf Studies, and Environmental Issues). The major strategies associated with all major R&D Programs are outlined in Appendix Q.

The other major R&D Programs in Strategic Goal Number 1 besides Operations Support include Optical Processing, New Expanded Tobacco, Cast Leaf, and Project ART. The New Expanded Tobacco and Cast Leaf Programs became major programs in 1990 to address various issues relating to the DIET and RCB processes. Some of the issues involved include capacity, quality, flexibility, and environmental concerns. Resources devoted to new expansion process development will decrease after 1993, when a new process must be ready to meet capacity issues. Cast Leaf resources will remain steady throughout the period due to the need to adopt the process to specific needs once it's developed. Optical Processing will continue to deal with the development and implementation of product inspection systems. These systems include a pack inspection system which will be ready for factory trial in first quarter, 1991; an off-line print inspection system which will be redesigned and delivered to QA and Colonial Heights Printing by early 1992; and an on-line web inspection system which will be delivered to Colonial Heights Printing in late 1991. Resource allocations are expected to be maintained throughout the plan period as the development of other inspection systems (i.e. cigarette) is initiated. Finally, resources devoted to the ART program will decrease dramatically (75%) over the plan period. Resources will be devoted mainly to process support and the development of the reduced nicotine segment products.

The Primary Improvement program will involve the characterization of existing primary processes to establish the baseline thermal history, chemical changes and flavor reactions. In addition, factors such as low operating cost, highly flexible operation, equivalent or improved product quality/subjectives, and environmental issues will be considered when simplifying the process. Process Plant Support involves general support to processing/recon plants and will most likely become part of the Operations Support Program in 1991 due to the continuing nature of these support activities. Computing systems, Measurement and Sensing of Physical and Chemical Characters (Process control systems) and Consumer Testing (33%) will function in a supportive role through the plan period. Expert systems, artificial intelligence, optical inspection software, process monitoring and control (i.e. Kabat® application), and various consumer monitoring programs constitute some of the components of these programs.

2026230263

Table 30

Operations Support Projects

Adhesives
Cigarette Monitoring
Materials Evaluation
Customer Complaints
Flavor Development Analytical Support
Marlboro Standardization
Alternate Humectants/Preservatives
Microbiological Quality Improvement
Monogram Inks
Packaging Inks and Solvents
Semiworks Support
Burley Spray/Dry Flavors
ETS Studies
Entomological Support
Engineering Studies/Method
Recon Sheet Certification
Cooperative Leaf Studies
Environmental Issues

2026230264

Strategic Goal Number 2 - Grow the Business Short-Term with New/Optimized Products and Processes for Both Domestic and International Markets.

Programs directed toward this Strategic Goal are listed in Table 27. Domestic Product Development and International Product Support (includes 41QZ personnel) are the key components of this Goal. A steady increase in resources is projected for the plan period in order to deal with an increasing number of new products. Because of the variety and complexity of some of the issues facing product development endeavors (ingredients, component consolidation, brand extensions, novel products, government regulations), additional resources are clearly needed.

The other programs listed in this Strategic Goal, some of which are major programs, largely support these new product endeavors. The Paper Technology/Reduced Sidestream Program and Project Ambrosia deal with sidestream acceptability issues, while the Low Tar/High Flavor program's objective is to increase the "value" of low tar products to the consumer. Older smokers would likely take advantage of a product with subjective advantages in this segment. Filtration Research and Flavors are aimed at providing a selection of alternatives for new product development that would maximize achievement of the program's goal. For example, the paper core concentric filter, developed in the Filtration Research program, is a key component of the Low Tar/High Flavor BOLD product. Consumer testing indicates that this filter enhances the "strength" and "impact" of the smoke in low tar cigarettes. Potential utilization of this filter in other products is being investigated. In addition, the New Packaging Concepts program contributes to new product development activities with package design alternatives.

Ultimately, the Menthol program is aimed at increasing PM representation in this market segment. Therefore, a successful entry product against solid brands like Newport and Kool would not be likely. Therefore, the Menthol program is aimed at developing a product with distinct advantages over Newport and Kool. Methods to stabilize menthol in the cigarette and increased "freshness" are being investigated.

Finally, consumer testing research is essential to successful product introduction. Consumer wants, perceptions, and subjective quality are necessary information for new intelligent new product development and commercialization. The quality of this test information is the key point of this program.

2026230265

Strategic Goal Number 3 - Address Consumer Wants and External Requirements With New Technology-Driven Products.

This strategic goal focuses on the needs of the consumer as they relate to external requirements. Government regulations and social acceptability issues are key driving forces for these programs. The program and resource allocations are listed in Table 28. Objectives and strategies for the major programs Project Tomorrow, Project Beta, TSNA, LBA, and Paper Technology/Reduced Sidestream are found in Appendix Q. Most of these programs are at least partly long-term in nature, and in most cases resource allocations remain steady. Although difficult to predict, efforts in ignition propensity (Project Tomorrow) and Lowered Biological Activity are likely to increase during some point in the plan period. Passage of the Fire-Safe Act of 1990 indicates that considerable product development work will be necessary after the completion of the work mandated by the Act. Significant resources are being devoted in the scientific community to develop direct experimental evidence relating cigarette smoke to lung tumor formation. Additional PM resources will most likely be needed to address any potential issues arising from this work. Resources in the LBA program would have been predicted to increase far more than indicated if R&D did not have access to other resources (INBIFO) skilled in this area. The Reduced Sidestream/Paper Technology Program is important to both the reduced sidestream issue and the ignition propensity issue. While certain products under development in Project Ambrosia are short-term in nature, additional flavors and flavor release compounds generated by Chemical Research personnel provide a longer-term component to this program.

Other programs in Strategic Goal Number 2 include Project PACT, which will conclude during the plan period. R&D efforts in this area will focus on the implementation of the already developed technology and the development of a university-based facility to design, develop and test air handling/ventilation action systems. Project Natural involves the development of an acceptable product with a minimal number of non-tobacco ingredients. The driving force for this work relates to the negative consumer perception of artificial components in consumable materials.

The Ingredients Program and the Reduced Tar and Nicotine Program both relate directly to government regulations, and efforts are expected to be maintained in these areas throughout the plan period. Aerosol research (50%) is included in this Strategic Goal because of its strategic importance to Project Beta, and the obvious strategic importance of Project Beta in addressing the external requirements facing the company.

2026230266

Strategic Goal Number 4 - Grow the Business Long-Term by Identifying, Evaluating, Developing and Implementing New Technologies Applicable to Future Products and Business Needs.

In the next five to ten years, our marketplace and product will be, in all probability, dramatically different from what we know today. Perceived health concerns, ignition propensity, social acceptability, environmental concerns and governmental regulations are likely to change our business significantly in the next five- to ten-year period. Therefore, resources (Table 29) devoted to longer-term projects are expected to increase significantly over the plan period. These increases are largely due to the identification, evaluation, and implementation of strategic technologies over the plan period. Selective Filtration, Selective Separations, Biochemical Processing, and the Chemical Senses are key components of this increase.

Project Beta (for Operational Plan, see Appendix A) is a key and steady component of the efforts devoted to this Goal. A Beta product would address most issues facing our products. Project Alpha, scheduled to be initiated once Beta is nearing completion, involves an extension of Beta to a novel configuration that does not necessarily relate to a cigarette. The optimization of the delivery device without regard to a cigarette-like configuration is the objective of this proposed area.

The Paper Technology and Low Tar/High Flavor programs both have long-term components. Paper is an essential controlling element of our products, and novel papers will be developed and tested to meet varied product needs. Chemical Senses is an essential program for our future. Chemical Senses research encompasses the development of a fundamental understanding of those physical, chemical and biological system interactions that result in a favorable response to the product. Through basic knowledge and evaluation of the taste and olfactory effects of our products, essential key product components can be maximized. The Flavor and Aerosol research programs also tie into future product development and studies on the chemical senses.

The Selective Separations and Selective Filtration programs are largely defensive. New Separations technology may be required in the future to address product component and/or environmental issues. The Biological and Biochemical Processing programs would also provide separation/destruction techniques through the use of antibodies, biosensors, and/or enzymes. Basic Analytical Research, Consumer Testing Research and Computing Systems would support long-term product development by providing the necessary tools by which to measure our future new products.

As part of the technology review process, the basic research areas that impact our major programs were identified. The basic research programs identified in this Strategic Goal

2026230267

also impact many other aspects of the R&D work product. The interdependent nature of these programs is depicted in Table 31.

2026230268

Table 31
Basic Research Support To R&D Major Programs

R&D PROGRAM AREAS	← BASIC RESEARCH AREAS →								
	Aerosols	Biological	Catalysts	Combustion Research	Computing	Consumer Testing	Flavors	Measurement /Sensing	Separations
Ambrosia						✓	✓		
ART		✓			✓	✓	✓		✓
Cast Sheet		✓		✓			✓		
Domestic Product Support						✓			
International Product Support						✓			
Expanded Product		✓		✓	✓		✓		
Filtration Research	✓		✓		✓	✓	✓		
LBA		✓		✓					✓
Low Tar/High Taste	✓	✓		✓		✓	✓		✓
Operations Support					✓			✓	
Optical Processing					✓			✓	
Paper Technology/ Reduced Sidestream	✓			✓			✓	✓	
Pact	✓		✓				✓		✓
Tomorrow			✓	✓	✓	✓		✓	
TSNA		✓		✓					✓

6920829202

I. IMPLEMENTATION

R&D Major Programs

The R&D Major Programs, their objectives and major strategies are outlined in Appendix Q. Operational Plans are developed for each program by the program coordinator and reviewed on a quarterly basis at the R&D Quarterly Planning meeting. Operational Plans for these programs covering the plan period have been drafted and will be reviewed at the December 1990 R&D Planning meeting. Final copies of Operational Plans will be appended, in a separate notebook, to this plan in early 1991.

Program Areas Currently Under Development

Several of the R&D programs listed, that are not major programs at this time, have the potential of becoming major programs during the plan period. These are key areas in which R&D is expected to build resources:

1. Primary Improvement Program
2. Environmental Issues
3. Combustion Research
4. Chemical Senses

The Primary Improvement Program would cover studies on the evaluation and simplification of primary processing in order to provide a low cost, highly flexible primary operation that improves product quality and processing emissions. Environmental issues will clearly impact our business operations during the plan period, and R&D's role involves technical support and process development improvement efforts. Combustion Research, or the chemistry and physics of combustion, involves the development of a knowledge based on the components of smoke, their tobacco precursors and methods of controlling their formation. The Chemical Senses program encompasses the development of a fundamental understanding of the physical, chemical and biological interactions that result in a favorable subjective response. The need for more control with traditional products (i.e. Low Tar/High Flavor) and the need to reproduce cigarette smoke subjectives in novel products (i.e. Project Beta) are the driving forces for these developing areas.

R&D Resources

Table 32 shows the projected resource allocations for PM USA R&D through 1995. Specific resource allocations by Program and Division are detailed in Appendices N and O, respectively. As outlined in this plan, the number of issues facing the Company are

Table 32

**Projected R&D Personnel Requirements¹
1990-1995**

	1990	1991	1992	1993	1994	1995
Directly Allocated	415.8	434.8	445.4	446.3	450.3	454.3
Support	118.2	99.2	100.6	108.7	108.7	108.7
Total	534.0	534.0	546.0	555.0	559.0	563.0
Exec. and Admin.	43.0	43.0	43.0	43.0	43.0	43.0
Total	577.0	577.0	589.0	598.0	602.0	606.0
Increase Over Previous Year	--	0	+12	+9	+4	+4
Cumulative Increase Over 1990 Budget	--	0	+12	+21	+25	+29
Projected R&D Expense Budget (Millions)	93.1	94.4	100.4	102.8	105.9	109.1

¹ Does not Include 41 QZ personnel.

2026230271

likely to increase over the plan period. The current R&D issues (Product Integrity, Value-Added, Health Perception, Social Acceptability, Government Regulations and Technology Management) will necessitate an increased effort on behalf of R&D. As indicated, a total increase in head count is projected for the plan period.

Financial Aspects

The projected R&D expense budget over the plan period is shown in Table 33. Figures are based on the head count increase (including salaries and benefits) and the consumer price index projections (4.2% in 1992, 5.5% in 1993, 5.1% in 1994, and 5.0% in 1995). Since the budget is based upon the total number of people, it increases proportionally to the added head count over the plan period. A comparison of the proportion of manpower allocations in 1991 to the percent of 1991 original budget devoted to each strategic goal is shown in Table 33. Interestingly, this exercise indicates that a considerable amount of resources outside of R&D are contracted to address key issues facing the Company.

Facility

The facility plan status is outlined in Appendix P.

Action Plans/Recommendations

Appendix P includes some proposed actions toward a key internal R&D issue--Technology Management. Technology Management encompasses a number of dimensions which were outlined in Table 8. Currently, R&D has a technology assessment function. The action plan extends the charter and participants of this group in order to provide a mechanism for the identification and development of strategic technologies. Personnel skills, the proper mix, dynamic needs, future availability issues, support of science education, recruiting, and training are also discussed in the Appendix P sections. R&D has mechanisms in place to deal with the utilization of internal resources, suppliers, and synergy. Many positive outcomes can be cited that resulted from these relationships. The protection of intellectual property rights is supported by an R&D Patent Committee and the Corporate Patent Consul and staff.

Finally, technology transfers and the commercialization of non-traditional products are key issues in Technology Management. Effective interdepartmental communications are essential to the successful implementation of new technologies. Many mechanisms are in place which enhance interdepartmental communication. These include: cross-functional training (Research to Development), organizational changes/lateral transfers both within and outside the department, quarterly planning meetings, the involvement of

Table 33

Comparison of 1991 Head Count and Financial Allocations to Each Strategic Goal

	1991 Percent of Total <u>Head Count</u>	Percent of Total <u>Budget</u>
Strategic Goal #1 Support	37%	31%
Strategic Goal #2 Grow - Short	32%	21%
Strategic Goal #3 Address	19%	37%
Strategic Goal #4 Grow - Long	12%	11%

2026230273

other Operations Departments in R&D quarterly planning meetings and Strategic Planning, and the allocation of personnel from other departments in major programs at an early stage in the program.

Communication between R&D and marketing is also essential to the effective commercialization of new products. A format now exists for this communication. The New Product Introduction Plan covers the short-term requirements of pending test markets and national introductions, as well as longer-term programs which are of market interest.

In summary, a discussion of several areas recommended for further action (several Technology Management issues and the Facility plan) is found in Appendix P. Other dimensions of the Technology Management issues are being dealt with using existing mechanisms. Vigilance to this issue must be maintained throughout the plan period.

2026230274

APPENDICES

2026230275

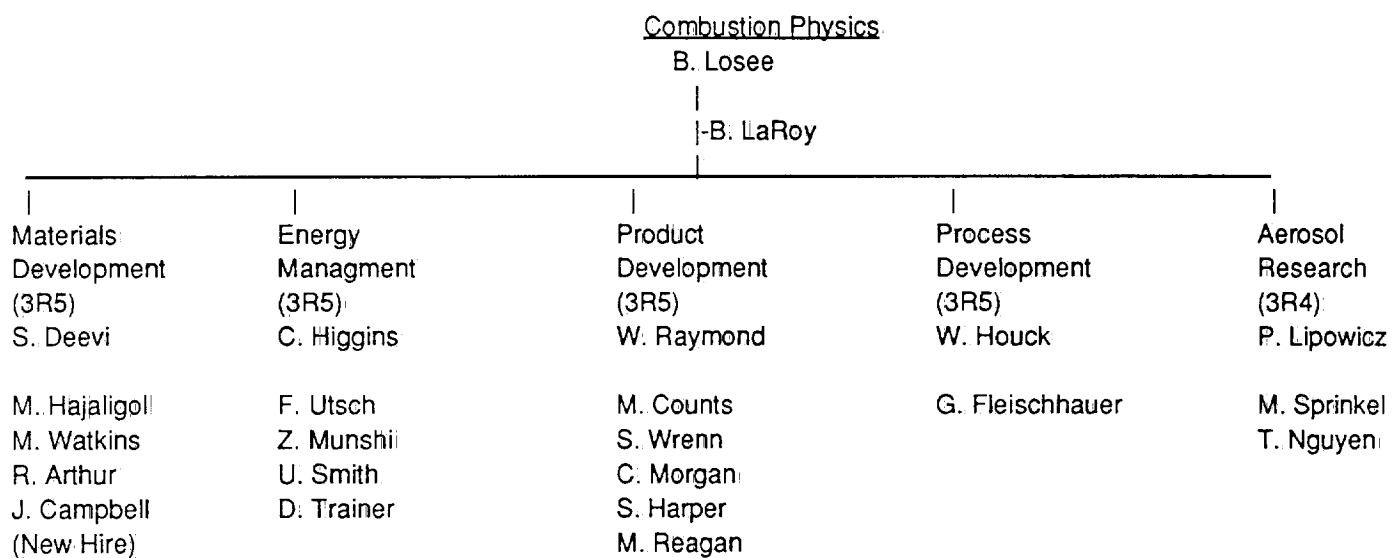
2026230276

APPENDIX A

Beta Plan

2026230277

Project Beta R & D Organizational Structure



2026230278

Operational Plan

Project Beta

Status:

Project Organizational Structure in place (see attached).
Phase I RTX Modules under evaluation.
Prime Contractor identified; development contract awaiting signatures.
Heater Design Team in place: concurrent approach to define manufacturable, low cost cartridge with R&D, Engineering and MDF personnel.

Plans:

Define RTX Prototype Performance - (2nd Quarter, 1991):

Electrical;
Delivery;
Subjectives:

Smoke Perception
Packaging.

Define Power Supply needs for Phase III device
(Dependent on Prime Contractor Involvement).

Define Manufacturable Disposable Cartridge - (2nd Quarter, 1991).

Define Application Methods:

Tobacco - (1st Quarter, 1992);
Ohmic contacts - (3rd Quarter, 1991).

Specify manufacturing process for Disposable Cartridge - (1st Quarter, 1992).

Delivery Phase III Modules - (3rd Quarter, 1992)
(Dependent on Prime Contractor Involvement).

2026230279

Appendix B

2026230280

APPENDIX B

PM Europe R&D Plan

2026230281

RESEARCH AND DEVELOPMENT PLAN 1991-1993

EXECUTIVE SUMMARY

The four scientific and technical departments of R&D with the assistance of the three support groups will concentrate their efforts on product and environmental issues during the planned period.

The R&D strategic goals include providing the support to maintain our market leadership through the development of innovative products, the maintenance of our product lines and providing for the Company the technology base necessary to address pressures from external sources. Emphasis will be given to product modification and monitoring to ensure compliance with emerging product legislations.

In addition to improving and developing new products which meet marketing requirements, Product Development will focus its attention on the medium and long term planning of the design of our product lines to ensure compliance with the future EEC tar ceilings. Moreover, emphasis will be given to the development of low delivery products using novel filters possessing specific characteristics and yielding product advantages.

Quality Assurance will concentrate on programs which will result in product quality improvements such as supplier rating, training of QA personnel in affiliates and licensees and improved supervision of sanitary conditions of our leaf purchases. During this 3 year cycle, an improved and standardized European system for the evaluation of consumer complaints will also be developed and used as a quality management tool. Standardization of the Marlboro flavor system with the USA will be pursued, resulting in significant cost savings.

In order to better support Product Development and to improve product monitoring to ensure compliance with future EEC tar ceiling limits, a significant increase in CI analyses will be made available during the planned period.

The Process Development Department will continue its ongoing efforts in order to standardize and improve affiliates' and licensees' primary processes which will significantly improve the quality and yield of the cut filler. Substantial support will be given to help the different factories to achieve their capacity increase plans.

2026230282

Besides its ongoing role of supporting Product Development and developing state-of-the-art analytical tools, the Research department will concentrate its efforts in contributing to the establishment of an efficient administration system (Data Management System) aimed at monitoring tobacco product legislation in all EEC/EEA markets. Emphasis will be given to product legislations and environmental regulations which may influence manufacturing practices. A plan, based on the German example, for monitoring compliance of all our products and factories to future legislation will be developed during the planned period.

2026230283

THREE-YEAR PLAN 1991-1993

PRODUCT DEVELOPMENT

PRESENT POSITION

1. SUPPORT THE CURRENT BUSINESS

MARLBORO

- Within the framework of the Marlboro Monitoring Program in the major EEC and EEMA markets, cigarettes for blind product tests have been made in order to monitor consumer perceived product performance.
- A blend optimization program has been conducted on the PE Marlboro. Product candidates have been tested in France, the Netherlands, Belgium, Germany and Switzerland. The market test results will be available in the fall of 1990.
- A tailor-made blend for menthol products was successfully developed which resulted in a new Marlboro Light Menthol (Tar: 9,0 mg, SN 0.7 mg) launched in France in July 1990.
- A program has been initiated in view of changing the size of Marlboro FF and Light from LS to KS in Finland. The implementation is foreseen to take place during the summer of 1991.

In order to be in line with the Tobacco Pesticide regulations in Germany, a blend optimization program has been achieved and implemented on Marlboro Lights in Germany.

- A blend and flavor combined with the cigarette construction optimization program has been started on licensees' products for Hungary, Yugoslavia, Poland, with the aim of bringing these products closer to the PE Marlboro.

PHILIP MORRIS

- A Philip Morris Ultra 100's (Tar 2.0 mg, SN 0.2 mg) was launched on the Swiss market in May 1990 as line extension of the Philip Morris Ultra KS.
- The development of two slim products, the Philip Morris Lights as well as the Philip Morris Multifilter Ultra Lights was completed and both products have been simultaneously introduced on the Italian market in January 1990.
- A Philip Morris Lights KS (Tar class 1, total weight below 850 mg) has been developed and launched in Sweden end of February 1990. In the same frame, the development of a Philip Morris Superlights within the same tar range is

2026230284

ongoing. Market introduction to take place in spring 1991 in Sweden.

- In order to be in line with the Tobacco Pesticide regulations in Germany, a blend optimization program has been successfully realized and implemented for the Germany Philip Morris Lights and Philip Morris Ultra Lights KS.

MERIT

As a line extension of the Merit (Tar 8.0 mg, SN 0.6 mg) a Merit Ultra Lights KS (Tar 4.0 mg, SN 0.4 mg) was launched in Switzerland in April 1990.

MURATTI

- In 1989, a Muratti family improvement program was implemented which involved blend/flavor as well as cigarette construction. The first development step of the program has been achieved on the Muratti Ambassador KS for Switzerland. It will be market tested in November 1990.
- A new Muratti Mild KS (Tar 4.0 mg, SN 0.4 mg) has been conceived and developed using concentric filter technology. The selected candidate is presently being market tested in Switzerland. The launch of that new product is planned for spring 1991.
- A new Muratti Ultra Light KS (Tar 1.0 mg, SN 0.1 mg) is planned to be launched in Switzerland at the same time as the above mentioned product. The development phase will be completed in October 1990.

L&M

- A new L&M Lights KS delivering Tar 6.0 mg, SN 0.4 mg has been introduced in the German market in May 1990.
- A new L&M FF KS (Tar 16.0 mg, 1.1 mg) & L&M Lights (Tar 11.0 mg, SN 0.8 mg) was developed and produced for the Norwegian market. It was launched in early September 1990.
- Blended flavor combined with cigarette construction optimization program was initiated in Eastern Europe countries licensees' products.
- In order to reduce product cost a blend construction optimization program is currently in progress on the L&M FF KS sold in Belgium.

CHESTERFIELD

- For standardization purposes within the Chesterfield family a change of blend was effected in January 1990 on the Chesterfield FF KS sold in Germany.
- In June 1990 a new Chesterfield KS FF was launched in Finland delivering Tar 14.0 mg SN 1.0 mg.

2026230285

- A Chesterfield KS FF (Tar 14.0 mg, SN 1.0 mg) and a new Chesterfield Lights KS (Tar 8.0 mg, SN 0.6 mg) have been manufactured. The Lights was market tested. Launch of both products is planned for autumn 1990 in Switzerland.

BRUNETTE

- A blend standardization on all Brunette family products has been successfully achieved in May 1990 and implemented on the Swiss market.

BELMONT

- A new Belmont 2002 Menthol (DPM 5.0 mg, SN 0.4 mg) for Finland was developed and produced for launch in early October 1990.

A program was started with the objective of changing the size of the Belmont family products in Finland from LS to KS. Implementation is expected to take place in summer 1991.

BOND

A new Bond Ultra Menthol (Tar 1.0 mg, SN 1.0 mg) was made. The product will be launched in Sweden in February 1991.

CONGRESS

- A blend optimization program on Congress FF KS and on Congress Lights KS for Saudi Arabia has been completed in early 1990. Implementation took place in July 1990. In view of a similar blend standardization, a change of blend is foreseen for late fall 1990 on Visa FF KS and Visa Lights KS in Saudi Arabia.

PARLIAMENT

- A new Parliament 100's Lights (Tar 10.0, SN 0.8) with charcoal recess filter was developed for the German market. This product was introduced in March 1990.

CIGARILLO TYPE PRODUCT

In the fall of 1989, a project was initiated with the objective of making a cigarillo-type cigarette for the German market, having physical and taste characteristics similar to an American blended product but using double wrapped reconstituted tobacco sheet. The development phase being already well advanced, the first industrial trials are planned to take place in November 1990 in Germany.

LOW COST PRODUCTS

In order to be positioned on the German market in the generic cigarette segment, a development of low SVC products was initiated. A selected candidate is presently market tested against the two major competitive brands (Magnum, Boston).

GDR BRANDS LINE EXTENSION

In view of the coming new market, development has started with line extensions of existing local brands such as F6, Karo and Jewel, having in mind as a first step to modernize the products while keeping similar taste characteristics.

CONSUMER RESEARCH

In a combined effort with Marketing Research France, a new questionnaire, to be used in Product Test Research, has been developed and successfully tested.

The results were presented to PMI Marketing Research Management in July 1990.

A study, using the French market as a model, was initiated and conducted with the objective to correlate market dynamics, measurable product parameters and subjective attributes based on sensory evaluation. The outcome of this study will provide a better and more accurate understanding on consumer perceived product performance.

2. NEW INNOVATIVE PRODUCTS

LENA (Concept PAPIROSSI)

- The directive of this project is the development of a papirossi-like cigarette with a low tar delivery.

A prototype (9.3 mg tar) was made by using a 50 mm recess and laser perforation

MOSELLE (Concept Recess)

- The development of a 25 mm recessed cigarette is achieved. A prototype (10.7 mg tar) was developed with the tobacco-high-density concept.

3. TECHNOLOGY MANAGEMENT

BASIC TECHNOLOGIES

The existing cigarette model was improved by introducing a more accurate filtration equation. Furthermore, its possibilities were extended, allowing the prediction of the puff-per-puff smoke yields for standard filter constructions, and the selection of the porous materials in order to obtain the desired ventilation level.

2026230287

4. EMERGING TECHNOLOGIES

- A new triple tube-in-tow filter, which significantly flattens the puff-by-puff profile has been successfully developed in order to improve smoke variations.
- The feasibility and reproducibility of the total blend expansion technology using blends treated before expansion has been demonstrated.

2026230288

THREE-YEAR PLAN 1991-1993

PRODUCT DEVELOPMENT

I. SUPPORT THE CURRENT BUSINESS

OBJECTIVE

Improve existing products and develop new products which meet the approved Marketing requirements while meeting standardization and productivity objectives.

STRATEGIES

- Support actively all programs aimed at monitoring consumer perceived product performance of our key brand families and initiate, when needed, product organization programs in order to ensure our competitive advantage in the market place.
- Improve and maintain our computerized project management system in order to optimize the speed and flexibility of the product development process and the allocation of the internal and external resources needed.
- Provide assistance and support to Manufacturing in order to ensure that product specifications are met during the initial production of newly developed cigarettes, and ensure that cigarette construction know-how is effectively transferred to the manufacturing centers.
- Develop and implement a program in order to reduce tar deliveries of all our brands (if needed) to ensure compliance with the 1993 EEC tar ceiling regulations.
- Develop a long-term plan with the objective to further reduce the tar deliveries of our brands to be in compliance with the 1997 EEC tar ceiling regulations. This plan will have to include future tar delivery segmentation (Light and Ultra Light) as well as an inventory of available emerging technologies which will allow tar reduction while maintaining taste quality at an optimum level.
- Ensure product standardization within brand families, and clear differentiation of product performance between brand families based on business objectives.

OBJECTIVE

Strengthen our understanding of consumer perceived product performance.

2026230289

STRATEGIES

- Monitor the evolution of the key competitive products by making optimum use of our current cigarette information activities and ensure quick awareness on competitors' new product introductions.
- Improve and maintain our internal descriptive panel in order to build a consistent data base on subjective product attributes of competitive products as well as cigarette prototypes.
- Improve and maintain, in collaboration with Marketing Research, the computerized model in which market dynamics are correlated with measurable and subjective product attributes in order to strengthen our understanding of consumer perceived product performance.
- Advise Marketing Research on qualitative and quantitative design and content of consumer test questionnaires in order to improve our understanding and the interpretation of consumer test results.

2. DEVELOPMENT OF NEW AND INNOVATIVE PRODUCTS WITH LONG TERM EARNING POTENTIAL.

OBJECTIVE

Create new and innovative product ideas/concepts for the cigarette market.

STRATEGIES

- Further enhance the interfacing of Product Development and Marketing in the creative thinking process.
- Keep an inventory of all new and innovative product ideas generated within the company.
- Develop and apply a screening system that can be used to select the most attractive opportunities.

OBJECTIVE

Increase the effectiveness in Technology Management in order to improve product and process innovation.

2026230290

STRATEGIES

- Increase awareness of Technology worldwide and maintain our Technology "storehouse" up to date.
- Strengthen our know-how on the Technology-Product relationships in order to:
 - a) Improve our mathematical prediction models with the ultimate objective of being capable to predict the mainstream and sidestream smoke deliveries on a per puff basis whenever a cigarette component is changed and conversely whereby the system selects components required to achieve product objectives.
 - b) Select and assess key technologies needed for the development of new and innovative products.
- Develop specifically the following selected technologies to the stage of industrial application:
 - Total Blend Expansion
 - Tube-in-tow Filter
 - Concentric Filter
 - Tobacco Sheet Filter
 - CA-web Filter
 - Tobacco Sheet Cigarette Wrapper
 - Dual Cigarette Wrapper
 - Tobacco Extract Flavors
 - Concentric Tobacco Rod

2026230291

THREE-YEAR PLAN 1991 - 1993

QUALITY ASSURANCE AND TECHNICAL SERVICES

PRESENT POSITION

1. STANDARDIZATION

- . Specifications for tobacco strips have been established and introduced for all offshore markets. The specifications include audit targets (values to be found during our TQA audit) and production targets (values to be found in the stemmery, before packing).
- . A standard procedure for the air separation efficiency of the stem tester, in line with the forthcoming Coresta method, has been elaborated. Its introduction at our suppliers level has started.
- . The introduction of the new PM infestation-control program in the Licensee factories and warehouses has started. The program is based on prevention, and consists mainly of thorough cleaning and infestation detection with pheromone trapping.
- . A standard method for the recovery and analysis of cut filler from cigarettes has been established. An instrument for the recovery of tobacco from cigarettes has been developed by PM-Berlin. This instrument, produced by an outside company, was introduced in all PME Affiliates.
- . A standard operating procedure for tobacco fumigation has been established. The procedure is in line with PM-USA recommendation. It awaits approval by PM management prior to being introduced.

2026230292

- . Specifications for main casing ingredients have been established and submitted to our suppliers. The specifications will be reviewed as soon as the US-specifications are available.
- . Menthol solutions used for foil-mentholation have been standardized. Two solutions have been eliminated, reducing the number of different menthol solutions from four to two.
- . A quality rating of our various suppliers has been established, based on a standardized reporting of defective/nonconform deliveries made to PM-Europe. This quality rating will impact next year's purchasing plan.
- . The task force of smoke-lab supervisors has made considerable progress towards standardization of methods used. Main topics completed include the method for GC analysis of water and nicotine in smoke condensate, organization of smoking analyses and the method defining the acceptability of a smoking run.
- . A task force including all DDD-panel leaders as well as leaf experts has been set up. Its main objectives are the revision of the PME DDD-method, standardization of training given to panel members and improvement of the consistency of results obtained by the different panels.
- . A task force including all Primary-QA supervisors has also been set up, with the objective of standardizing methods and specifications used in the European Primaries.

2. CORESTA / ISO

- . Considerable efforts have been dedicated to the CORESTA "harmonization" project. A new method is being established which will ensure the equivalence of smoking results from various types of smoking machines.
- . A new gas chromatography column, recommended to Coresta by PM for the analysis of smoke nicotine, should be qualified by end 1990.

- . ISO specifications for the new monitor cigarette IM-13 are being established through cooperative efforts between PME and PM-USA smoking laboratories.

3. VISUAL INSPECTION

- . The new Philip Morris Packaging Standards have been completed and distributed to the Affiliates. The standards for cigarettes, prepared in cooperation with PM-USA, were finalized and will be available early 1991. Introduction of the new system in PME will start at the beginning of 1991.
- . Comparative studies between old and new visual inspection methods have been completed and showed that similar results are obtained using adequate weighting factors.

4. MATERIAL QUALIFICATION

- . Three major projects for material qualifications have been completed. They include the qualification of Courtaulds Tow 3.0/35'000 Y for Pan-European Marlboro KS, new base papers for tipping papers which improve filter-tip-attachments and upgrading/standardizing medium- and high-porous plug wraps.
- . The elimination of Carbowax from all white and black semi-filters is well in progress. Panel results have been positive and supportive.
- . A project has been launched in order to introduce "concentrated base flavors" in European productions.

2026230294

5. FILTERS

- . A reduction of filter tow-weight has been achieved through the successful introduction of the "Rhodia-Tongue" and the reduction of filter diameter.
- . A project has been initiated in order to provide technical assistance to all PME factories to improve filter consistency and machine efficiency as well as to reduce material wastage and manufacturing costs. Initial discussions took place in all manufacturing centers with representatives of Production, Engineering, Purchasing and Quality Assurance.
- . Monthly interlaboratory tests on main filter characteristics have been fully implemented using monitoring filters.

6. FIRMNESS

- . All firmness instruments in PM-Europe have been checked by R&D through on-site visits. The influence of even slight temperature variations on firmness has been proven and corrective actions initiated.

7. SMOKING LABORATORY

- . The method for water and nicotine analysis in smoke condensate has been changed. Gas chromatography has been introduced to replace the analyses by Technicon.

8. AUDITS/ASSISTANCE TO LICENSEES

- . Upon request of local management, the quality system in the Tenerife factory has been audited. Conclusions have been presented and are currently being discussed.
- . On-site visits have been made to various Licensees with the objectives of improving visual quality or assessing actual quality systems.

THREE-YEAR PLAN 1991 - 1993

QUALITY ASSURANCE AND TECHNICAL SERVICES

I. AGGRESSIVELY SUPPORT THE CURRENT BUSINESS

A. Objective

Ensure the standardization of procedures and analytical methodology within the framework of Quality Assurance, in order to guarantee quality consistency and uniformity of our products throughout PME. Ensure coordination with PM-USA.

STRATEGIES

1. Incoming Inspection

- . Ensure that PME incoming inspection/material monitoring procedures fulfill legal requirements.
- . Continue the revision and updating of methods used for the analysis of ingredients, filter additives and adhesives. Complete new specifications by 1991. Standardize with PM-USA. Revise the incoming-inspection procedure for these items.
- . Continue the revision of packaging-material specifications and complete it by end 1992.
- . Finalize, together with Purchasing, the supplier-rating system. Based on the supplier rating, set up a supplier-improvement program.
- . For selected items, introduce an acceptance procedure based on supplier certificates, audits and quality records.
- . Continue efforts for the introduction of concentrated base flavors for Marlboro production, thus standardizing the flavor system with PM-USA and contributing to substantial cost savings.

2. Subjective Testing

Review and standardize the methodology used for taste evaluation while considering the results of the monitoring initiated in 1989.

3. CORESTA/ISO

Participate in the Company's efforts leading to the approval of appropriate testing methods of ours and competitors' products, with emphasis on cigarette analysis and physical characterization of tobacco.

4. Analytical Smoking

Take advantage of the PM Smoking Laboratory working group, created in 1989, to adapt current PME procedures to the new requirements of CORESTA/ISO methods when the latter are enforced. Another main objective of the task force is to harmonize smoking procedures.

5. Primary

Take advantage of the primary working group, established in 1990, to standardize critical methods and specifications in the European Primaries.

6. PM-Spain

Integrate PM-Spain into the PME-QA system through technical assistance, training, interlaboratory tests and monitoring. Ensure that products comply to legal and PME requirements.

7. Physical Testing

Set up a QA task force for the analysis of physical cigarette parameters. Ensure through revision of methods and interlaboratory tests that results reported by the various laboratories are comparable.

2026230297

B. Objective

Establish and maintain efficient product auditing systems in order to ensure optimization of product quality.

STRATEGIES

1. Material Evaluation/Testing

- . Continue audits of main suppliers of nontobacco materials.
- . Selectively reduce material inspection in the laboratory for standard materials.

2. Cigarette Information

- . Review current cigarette-information activities in order to support Marketing and Product Development with information on the market situation. Ensure quick information on competitors' products. Replace the actual "Coldac" system by the DEC-Beckman CALS data acquisition system.
- . Study, with Product Development, the possibilities to use the actual data base to produce comprehensive reports on important cigarette properties, e.g., tar/SN ratio, tar per puff, etc. This information would enable correlating market data with cigarette characteristics.
- . Develop the actual monitoring function for cigarette-information laboratories to cope with the increasing number of official laboratories in the two regions. Strengthen contacts among specialists within our Affiliates.
- . Develop the capacity of the cigarette-information laboratory to cope with future needs. Contribute to the project of a new smoking laboratory.

2026230298

3. Filter and Firmness Monitoring

Make use of the reports created in 1989 in order to identify opportunities for improvement and act as a catalyst within the region for the dissemination of respective technical solutions.

4. Visual Inspection

- . Introduce the new visual inspection handbook, prepared in cooperation with PM-USA, in all Affiliates and Licensees. Standardize visual inspection throughout the region and with PM-USA, which will lead to an increased objectivity of product evaluations.
- . Introduce VQA-laboratory monitoring.
- . Replace the current centralized factory audit system by a standardized and comparable local audit. Increase efforts for centralized market audits.

5. Customer Complaints

Set up, together with Marketing/Sales, a procedure for an efficient and objective acquisition/evaluation of customer complaints. Standardize this procedure throughout PME and use the results for defining of QA-objectives.

2026230299

C. Objective

Develop Quality Awareness within Philip Morris Europe.

STRATEGIES

1. Workshops / Seminars

- . Promote the organization of seminars, workshops and quality campaigns within PME Affiliates and Licensees.
- . Organize seminars to improve the utilization of statistics in quality assurance.

2. Training Tools

- . Review and update the slide show "Quality Assurance in the Cigarette Industry".
- . Develop a training program on infestation control and fumigation.

3. Salesforce / Distributors

Protect product quality in the market place by making Quality-oriented training programs available to the salesforce and PM distributors.

2026230300

D. Objective

Develop product knowledge and master new technologies in order to ensure our technical expertise and responsiveness. Promote the transfer of current and newly developed technologies within the PME Quality Assurance Departments.

STRATEGIES

1. Tobacco Monitoring

Analyse the physical characteristics of the tobaccos used in PME and correlate them to the yields in Primaries and Secondaries as well as to the finished-product quality.

2. Consumer Perception of Quality

Evaluate information available on the consumers' perception of cigarette quality. Make use of the data for targeted product quality improvement.

3. Machinability of Materials

Identify supplies' specific parameters that influence machinability and develop related testing methods. Ultimately, revise material specifications accordingly.

4. Filter

Further develop "filter manufacturing support" and provide technical assistance to PME factories to improve filter consistency and machine efficiency as well as to reduce material wastage and manufacturing costs.

2026230301

5. Quality Problem-Solving

- . Make use of visual inspection results to detect common problem areas and propose action plans.
- . Develop the flow of information between PME and PM-USA to address and exchange specific quality-related improvements, e.g., aspect quality.

6. High-Speed Machinery

Study the impact of increased automation brought about by the new machine generation on current QA activities. Revise procedures accordingly.

7. PME Affiliates/Licensees

Provide assistance to all manufacturing centers for quality-related programs/problems.

8. External Official Testing Laboratories

Maintain close contact with official testing laboratories. Ensure that official laboratories test correctly PM products through adequate monitoring, and provide scientific assistance in areas that are critical to our business, e.g., GCC.

2026230302

9. Infestation Control / Fumigation

- . Assist AOD in the implementation of the new PM infestation-control program in the production and storage areas of our Licensees.
- . Improve the quality of PME tobaccos with respect to infestation control through training our leaf suppliers in phosphine fumigation.
- . Study/develop, together with PM-USA, alternative technologies for pest control which could efficiently replace phosphine fumigations.

16.10.90/3year91b.dis

2026230303

THREE YEAR PLAN 1991-1993

RESEARCH

PRESENT POSITION

- Analytical support in all areas of cigarette manufacture has been intensified. In conjunction with Packaging Engineering, EEC and PM suppliers, an ongoing program is directed at finding further printing systems (offset, water-based) which are subjectively acceptable.
- Blend components and ingredients used by PMG are regularly screened to ensure compliance with the German Food Law.
- A program with PME Process Development was aimed at optimizing oriental tobacco treatment in primary processing. Treated tobacco has been favorably evaluated by Panel A. The program has been transferred to Process Development for industrial trials.
- In-house research programs on ETS in offices are continuing with extended analytical coverage. Assessment of the methods through collaborative studies is pursued. Support and control of independent laboratories subcontracted to work on ETS is continuing in co-operation with S&T.
- The program to investigate the influence of various cigarette wrappers including double wrappers on sidestream smoke yields has been completed. Sidestream determinations as support to Product Development PME and PM-US are continuing to be performed.
- A study to investigate whether ozone can be measured with commercially available instrumentation in the presence of sidestream smoke and ETS has been completed.
- The routine measurement of sidestream smoke yields in nicotine, particulate matter and carbon monoxide by using a four-channel single-cigarette apparatus has been extended to the determination of sidestream smoke visibility. The monitoring of total sidestream smoke is under development.

2026230304

- EEC, EEMA and competitive brands are continuing to be screened for selected filler and smoke components.
- InfraAlyzer methods to determine main components in base and application flavors are being implemented in PMG Munich and Berlin factories.
- Improved analytical methodology for determining critical pesticides on tobacco (e.g., MH-30, DTC) has been developed and is being implemented. Monitoring of pesticide residue levels in leaf tobacco and in finished products is continuing as to be in compliance with the specific laws of the EEC and EEMA regions.
- An integrated biocontrol system to prevent microbiological activity during tobacco processing and storage was developed.
- The identification of tobacco-identical inhibitory compounds isolated from Oriental tobacco is continuing.
- A program to investigate the influence of processing conditions on tobacco microbiology and subjective quality of the final product was initiated.
- Microbiological support to PM affiliates and licensees to control shelf life in tobacco storage and processing is continuing.

2026230305

THREE YEAR PLAN 1991-1993

RESEARCH

I. AGGRESSIVELY SUPPORT THE CURRENT BUSINESS

A. Objective

Improve product quality by the development and application of new analytical methodology.

Strategies

Develop new approaches to identify and solve off-taste/off-odor problems in PM products.

Introduce gas chromatography coupled with Fourier transform infrared spectroscopy to extend identification capabilities.

Maintain and further develop a program to correlate subjective and chemical changes in cigarettes caused by different printing techniques used for packaging materials. Extend program to offset and water-based printing systems and to the EEMA region.

Assure that sidestream yields of PM products are in compliance with future internal guidelines and provide regular market-place surveys.

Intensify efforts towards implementation of NIR technique in production areas.

Speed-up pesticide residue routine analyses by developing and implementing GCMS-based screening techniques for classes of pesticides.

2026230306

B. Objective

Monitor the compliance of blend components and ingredients with the legal requirements in both EEC and EEMA regions.

Strategies

Maintain and continue to upgrade the monitoring program for chemical constituents in all materials going into the fabrication of a cigarette so as to be in complete compliance with specific laws within PME.

Continue monitoring of pesticide residue levels in leaf tobacco and finished products.

Extend program to new pesticides as requested by PME management and/or legal requirements of the EEC and EEMA regions.

Strongly support Leaf Department in controlling critical pesticides (e.g., MH-30, DTC) in PM brands.

Centralize and computerize in co-operation with PM-US information regarding legal situations and requirements in the fields of pesticides, additives and packaging materials of all EEC and EEMA markets, in order to be able to immediately react to legal changes.

C. Objective

Assess the impact of environmental tobacco smoke (ETS) on indoor air quality in order to provide maximum technical assistance to corporate affairs.

Strategies

Continue the in-house program to monitor selected ETS components in real life environments during the course of controlled smoking sessions.

Support independent outside ETS studies in direct co-operation with PME-S&T aimed at assessing ETS exposure and its impact in real life environments.

Improve on existing analytical methods for assessment of ETS exposure, e.g., find more restrictive determinations of ETS related to respirable particulate matter.

2026230307

D. Objective

Support corporate affairs in defending industry position.

Strategy

Actively participate in inter-company analytical programs leading to industry and government accepted methodology.

II. DEVELOP PRODUCTS WHICH ADDRESS THE CONSUMERS' DESIRE TO REDUCE THEIR HEALTH CONCERNS

A. Objective

Acquire technical information necessary to develop new products or to modernize existing ones so as to have acceptable products with excellent commercial quality available.

Strategies

Reduce the pyrolysate fraction of cigarette smoke condensate by modifying the cigarette filler and maintain at the same time the consumers subjective acceptability of the modified product.

Evaluate new filter concepts as generated within and outside of R&D to determine product advantages in the market-place due to selective elimination of certain smoke components.

III. DEVELOP PRODUCTS WHICH ADDRESS THE PUBLIC'S DESIRE TO REDUCE ENVIRONMENTAL TOBACCO SMOKE

A. Objective

Develop basic knowledge to focus on problems related to the development of new products which addresses the environmental tobacco smoke (ETS) issue.

Strategies

Continue the program to investigate the formation of undesirable components in aging cigarette sidestream smoke and develop an understanding of how to control them.

2026230308

Study the effect of cigarette parameters and filler additives on total sidestream smoke yield and in particular on gas phase composition.

Investigate ways to diminish the sensory impact of environmental tobacco smoke.

IV. DEVELOP NEW PRODUCTS WHICH CAN BE MARKETING USING CURRENT STRATEGIES AND GIVE SMOKERS A PRODUCT ADVANTAGE

A. Objective

Contribute to the development of new or improved products designed to give tailored delivery profiles by providing analytical data and developing new analytical methodology to meet the needs of Product Development.

Strategies

Maintain the program for the measurement of puff-by-puff mainstream smoke deliveries of selected components. Upgrade methodology for use as a routine analytical method by QA.

Identify the causes of the development of butt odor in order to eliminate them.

V. IDENTIFY NEW PRODUCT/INTERNATIONAL PROCESS CONCEPTS AND DEVELOP PRODUCTS/PROCESSES FOR THE INTERNATIONAL MARKET

A. Objective

Improve the taste characteristics of tobaccos.

Strategies

Correlate subjective, chemical and microbiological changes in cigarettes caused by primary processing practices.

Continue monitoring of temperature and water activity in tobacco processing in our European primaries.

Study the impact of processing conditions on tobacco microbiology and the resulting effects on product quality.

Control tobacco microbiology and sensory characteristics by implementing microbial processing specifications.

VI. PROVIDE A BROAD FOUNDATION OF BASIC RESEARCH THAT WILL
GENERATE NEW PRODUCT CONCEPTS IN 5-15 YEARS

A. Objective

Maintain the scientific, technical and innovative base required to support PME's emerging business.

Strategies

Develop technical expertise through the training of Research personnel.

Encourage innovation by patenting and publishing research results.

B. Objective

Continue basic research on tobacco microbiology and develop applications in the field biotechnology within PM which will favorably impact on new or existing products and/or processes.

Strategies

Continue research towards more appropriate natural preservatives and pesticides to provide alternatives to existing systems.

Improve product quality by bio-removal of specific tobacco compounds in close co-operation with an external institute.

Continue to study the physiology of identified bacteria as a function of tobacco water activity and heat treatments in primary processing.

Study the metabolism of these bacteria and evaluate their impact on the subjective quality of the finished product.

2026230310

THREE YEAR PLAN 1991 - 1993

PROCESS DEVELOPMENT

PRESENT POSITION

The Process Development Division establishes and implements programs aimed at product and process improvements for affiliates and licensees in both PME regions in order to contribute efficiently to the operational goals on quality, cost, productivity and flexibility.

During the past year significant progress was achieved in a number of Process Development programs. Our group has in general concentrated more efforts on larger projects, particularly those related to ET and primary processing in our European affiliates.

- The tobacco process quality program was continued and further improvements were achieved regarding the consistency and interpretation of the data, the reporting format and the inclusion of highlights. Monthly reports and quarterly comparisons were published.
- The cross-evaluation of European and US ET was completed. Trials were successfully run in the Richmond M/C DIET facility, the ET pilot plant and in the PMG ET installation in Berlin.
- An optimization and standardization program regarding the ET plants in our European affiliates was initiated. Review visits for the evaluation of process operating and quality parameters were completed and improvements were implemented.
- Standardized information of primary equipment and operations was completed for and presented in Bergen op Zoom and Berlin. The other two affiliates, Munich and FTR, are scheduled for completion by the end of 1990.
- Further improvements were implemented in the Miniprimary which continues to operate smoothly. The replacement of a steaming conveyor by an HT Tunnel was studied and is planned for installation during 1991.
- Several studies requested by the Leaf Department were completed, are in progress or near completion. These include the evaluation of ripper short sieving, cross cutting trials in the Miniprimary, small lamina removal in the primaries and the FC and BU Malawi study.
- We contributed to the PM Process Synergy Meeting and a presentation was given at the 1990 Tobacco Colloquium.

2026230311

- Assistance was provided to AOD of both regions, particularly for primary project reviews, ET and stem process evaluations at MTI in Bologna, Verona and Trieste.
- The Burley standardization and capacity increase was completed for Munich and is in progress in Berlin including start-up and qualification of their new P&S dryer.
- Completed projects include BBS in Munich, ET trials for Swedish Tobacco and China at FTR and evaluation of FC and BU tobaccos from Turkey.
- The evaluation of the COMAS stem puffing system was initiated and is partially completed.
- Assistance was provided to BOZ in trial processing of a Marlboro blend through the Dickinson direct cylinder conditioning, backed up by trials at COMAS with their slicer and DCC system.

2026230312

THREE YEAR PLAN 1991 - 1993

PROCESS DEVELOPMENT

OBJECTIVE 1

Develop and implement programs focused on standardization of primary processes and tobacco materials among PM European affiliates and with PM USA.

Strategies

- Optimize and standardize processing parameters and operating conditions in the four European ET plants for improved consistency of operations and interchangeability of the ET product.
- Organize technical review meetings with participants from all European ET plant locations and assist in solving specific problems as required.
- Streamline the tobacco process quality program and implement the take-over by QA of the routine reporting.
- Continue to review and interpret primary data, particularly for defining trends and factory comparisons, with various groups from affiliates and R&D.
- Complete the programs for standardizing the Burley processing in Berlin, including start-up and qualification of the new P&S dryers.
- Develop and implement a program for increased cutting OV.
- Be involved in the evaluation and the installation of foreign matter detection and removal systems.

OBJECTIVE 2

Assist in implementing the capacity increase program for primary processing equipment in co-ordination with the PME affiliates to meet the goals set by Operations.

Strategies

- Contribute to the implementation of the primary extension programs by assisting in the establishment of the engineering projects for new primary equipment. Projects include the primary extension and the new ET plant in B0Z, the installation

2026230313

of LEGG dryers in Berlin, the BBS processing and cut filler pack-out in Munich, the separate ET line in FTR Onnens and the FTR primary improvement program.

- Participate in planning meetings to discuss design concepts and layouts.
- Provide assistance for selecting equipment and defining process parameters, for start-up and qualification of new equipment or modified processing lines.

OBJECTIVE 3

Increase the level of technical assistance for primary process quality assessment and optimization within affiliates, licensees and other groups of both PME regions.

Strategies

- Respond to Manufacturing requests for assistance. Develop and complete programs, evaluations or blend component studies.
- Perform project reviews, establish recommendations for process improvements and provide assistance and consulting service to licensees to improve unit operations, stem treatment and ET processing.
- Participate in workshops and provide training for licensee personnel.
- Further optimize the operation of the Miniprimary and the support laboratory for increased flexibility, improved safety and maintenance.
- Implement the HT project in the Miniprimary in 1991.
- Complete the project for a data acquisition system in the Process Development laboratory.
- Complete the evaluation of small lamina removal from strip in the stemmeries, their utilization, and implement the follow-up accordingly.
- Evaluate the results on the total blend sieving and cutter bypass in the PM Australia primary and develop recommendations for Europe.
- Investigate the utilization of factory generated OTM"s.
- Implement trial programs adequately as required and further improve planning, data interpretation and reporting.

2026230314

OBJECTIVE 4

Develop, evaluate and implement new processing technologies for potential application in PM facilities.

Strategies

- Complete the evaluation of the COMAS stem puffing process.
- Continue the evaluation of direct cylinder conditioning as an alternative to vacuum pre-conditioning.
- Evaluate cut filler recovery from Winnowers.
- Stay abreast of the development of new cast sheet and expansion technologies by Richmond R&D.
- Participate and support programs related to reconstituted tobacco processes and materials as required.
- Identify technologies in industries similar to ours and intensify contacts with equipment suppliers to keep abreast of new developments.

OBJECTIVE 5

Further improve our expertise and technology transfer through exchange and co-ordination with the technical community.

Strategies

- Complete the documentation on standardized primary information for all European affiliates.
- Outline major differences between primaries. Establish and implement an up-date procedure on a yearly basis and develop general primary guidelines.
- Organize the 1991 Tobacco Colloquium, participate and contribute to synergy meetings with other PM units.
- Continue to improve technical expertise and flexibility of the Process Development personnel by further intensifying on-the-job cross-training.
- Ensure professional training and rapid integration of new process engineers.

2026230315

APPENDIX C

Technology Review

2026230317

Areas of Particular PM USA R&D In-House Expertise

The PM USA R&D staff includes personnel with training and/or experience in most areas of science and technology. The listing below indicates the areas of particular expertise which are pertinent to the current Programs.

Alkaloid Chemistry	Chemistry of nicotine and related compounds.
Carbohydrate Chemistry	Chemistry of cellulose, starch and sugars.
Cigarette Design	Specification of cigarette parameters to produce desired smoking characteristics.
Combustion/Pyrolysis Mechanisms	Physical mechanisms & chemical pathways which control thermal decomposition.
Computer Simulation	Use of computers to replicate and predict the behavior of physical systems.
Consumer Testing & Product Evaluation	Test design and analysis to determine consumer attitudes and product preferences.
Electron Microscopy	Research applications of transmission and scanning electron microscopes and associated instrumentation.
Expansion Science & Technology	Hydrate formation, blowing processes, thermal hardening as they relate to tobacco expansion.
Expert Systems	Design of computer systems to make or guide decisions or control processes.
Filtration Processes	Physical and chemical processes to remove vapor and/or particulate components from air or smoke.
Flavor Chemistry & Formulation	Preparation of natural or synthetic compounds to produce desired subjective responses.
Image Processing	Acquisition and manipulation of digital image data for measurement, recognition or inspection.

2026230318

Instrumental Chemical Analysis	Design and use of instruments for determining the nature and concentration of chemical species.
Microwave Theory & Technologies	Use of microwaves for basic studies of materials, or operations such as moisture measurement or drying.
Neural Computing	Use of connected networks of simple computing elements for recognizing input information or determining relationships between sets of information.
Nuclear Counting	Measurement of extremely low levels of radioactivity. Use of radiochemical detectors.
Optical & Laser Technologies	Theoretical and experimental optics. Laser applications.
Organic Synthesis	Production of organic molecules from precursor compounds or elements.
Paper Making & Development	Paper design, fillers, surface treatments, manufacturing.
Perforation Technologies	High speed laser and electric spark perforation of paper.
Separation Technologies	Supercritical fluid, membrane and fixed bed separations.
Sheet-Making Processes	Cast & reconstituted tobacco sheet.
Statistical Process Control	Applications of statistical analysis to process control and problem diagnosis.
Theoretical Chemistry	Mechanisms controlling chemical structure and reactions.
Thermal Physics	Mechanisms of heat storage and transfer.

2026230319

1990
PM USA R&D Collaborative Research Programs

Program Description	Location	Budgeted Amount (\$000)	
		1989	1990
Heat Sources/Combustion Modeling/ Sigma	NY Polytechnic	907.0	579.0
Project Delta/Sigma	Stone Products	100.0	40.0
Project Beta	Pinnacle Research	200.0	100.0
Project Beta	Motorola	0.0	1,145.0
Project Beta	Coors	0.0	145.0
Gustatory and Olfactory Research/ Flavor Development	Monell	30.0	0.0
Localization of Nicotine in Tobacco/ART	Cambridge Univ.	55.1	8.8
Use of MS/MS/Analytical Support	Univ. of Nebraska/ Univ. of Pittsburgh	3.0	0.0
Study of CO Sensors/ETS	VCU	13.2	13.3
Nornicotine Determinations/TSNA	Cumberland Consulting Chemists, Inc.	8.9	0.0
Preparation of Nicotine Antibody/ART	Litron Laboratories	19.9	8.3
Two Dimensional Gel Electrophoresis/ TSNA	PDI	20.0	12.5
cDNA Expression Library/TSNA	Various	5.0	7.0

2026230320

1990
PM USA R&D Collaborative Research Programs
(Continued)

Program Description	Location	Budgeted Amount (\$000)	
		1989	1990
Protein Sequencing/TSNA	Various	4.5	6.0
Pesticide Work	Tobacco Pesticide Group	4.0	0.0
Neutron Radiography	University of Va.	142.0	150.0
Sol-Gel Research/Paper Tech.	NY Polytechnic	135.0	135.0
Low Level Counting	Battelle NW	20.0	15.0
Inorganic Binders/Paper Tech.		0.0	36.1
Lumen Loading/Paper Tech.	Univ. of Washington	18.0	0.0
Sol-Gel Analysis/Paper Tech.	VPI	38.2	90.0
Paper Technology	Univ. of Maine	60.0	60.0
Menthol Release	Callery Chem/Lee Labs	77.0	40.0
Custom Synthesis	VCU/Aldrich/Lee Labs	0.0	183.5
Cluster Formation (Aerosols)	Colorado State	109.5	92.9
Oxidation Catalysts/Selective Filtration	Seton Hall Univ.	0.0	76.1
Project Sigma	Procedyne	229.0	0.0

2026230321

1990
PM USA R&D Collaborative Research Programs
(Continued)

Program Description	Location	Budgeted Amount (\$000)	
		1989	1990
Optical Processing	Carnegie-Mellon	54.4	40.1
Dynamic Nuclear Polarization/Analytical Support	Colorado State	31.7	0.0
Simulation of Liquids & Aerosols/ART	VPI	38.7	43.3
Single Particle Aerosol Chemistry	Univ. of Washington	0.0	35.0
Thermodynamic Properties of Supercritical Fluids	Georgia Tech.	12.0	12.5
Supercritical Extraction	Supercritical Proc. Inc.	153.4	16.0
Project ART Water Column	University of Texas	27.5	27.5
Combustion Research/Beta	MIT	25.0	0.0
Project Sigma/Beta	Laser and Mechanical Systems	5.0	90.0
Aerosol Research	VCU	0.0	14.7
Optical Processing	Unicorn Systems	1.2	0.0
Project Sigma Development	Stackpole Company	395.0	230.0
Project Beta Development	Stackpole Company	0.0	193.4

2026230322

1990
PM USA R&D Collaborative Research Programs
(Continued)

Program Description	Location	Budgeted Amount (\$000)	
		1989	1990
Project Pact		0.0	108.1
Corrosion Research/ART	Dupont Safety Mgmt.	269.2	137.5
ART Pilot Plant Design		9.6	11.0
Aquarium Disposal Studies/ART		0.0	82.9
Carbon for Plug-Space-Plug-Filter	Stackpole Company	55.0	0.0
R&D Computer Operations	Index Group	44.0	0.0
Engineering Services	Nolen, Friska, Brooks	20.0	18.9
Emergency Response Team	FDM Safety Services	22.0	21.0
Contract Programming	Computer Horizons	42.0	0.0
Contract Programming	McKinney & Assoc.	13.0	0.0
Contract Programming	Fortex	15.0	0.0
Contract Programming	Various	18.0	7.8
Total		3,451.0	4,033.2

Collaborative Research Programs are budgeted in the following accounts:
Professional Services, Consultant Services or Purchased Services.

RESEARCH PROGRAMS
1989-1990
Cosmic/Sensory Research

	<u>1989</u>	<u>1990</u>
<u>Professional Services</u>		
Dr. Mangan	\$180.0	\$118.5
Dr. Eysenck	175.0	78.6
Dr. Harley	32.0	33.1
Dr. Ashby/Dr. Nosofsky	<u>0.0</u>	<u>72.4</u>
Total	\$387.0	\$302.6

Consulting

Dr. Eysenck	\$ 3.3	\$ 3.4
Dr. Haier	1.9	2.0
Dr. Harley	2.9	3.0
Dr. Mangan	3.8	4.0
Dr. Warburton	3.8	4.0
Dr. Frijters	3.3	3.4
Dr. Falmagne	1.9	2.0
Dr. Nosofsky	1.9	2.0
Dr. Ashby	1.9	2.0
Dr. Mullen	<u>5.3</u>	<u>5.5</u>
Total	\$30.0	\$31.3

2026230324

**PM USA R&D
1989-1990 Consulting Relationships**

Program Description	Consultant	Budgeted Amount (\$000)	
		1989	1990
ANSI	R. Dawson	\$ 4.0	\$ 4.2
Regulatory Agencies	J. Stoffberg	4.8	0.0
Chemistry and Biochemistry	A. Wolf	12.0	12.5
Analytical Chemistry	F. Hawkrige	2.5	2.0
Localization of Nicotine	P. Echlin	9.2	6.8
Spectroscopy/IR Methods Development	R. Jacobsen	0.0	5.3
Elemental Analysis	T. Rains	1.5	0.0
Wet Chemistry	Cumberland Consultants	0.0	4.7
Sequencing/Protein Isolation Separation Techniques		6.5	7.4
Analysis Development	Dr. Berntson	1.5	2.0
Electrophysiology	Dr. G. Kobal	2.2	0.0
Waveform Analysis		0.0	1.5
Cigarette Paper Properties	Dr. Mattina	24.0	6.5
Organic Chemistry		0.0	6.5
Pyrolysis of Cellulose and Paper and Aerosol Formation	Dr. Chum	0.0	4.0

2026230325

PM USA R&D
1989-1990 Consulting Relationships
(Continued)

Program Description	Consultant	Budgeted Amount (\$000)	
		1989	1990
Nicotine Removal and Destruction	Dr. Fair	\$ 0.0	\$ 4.0
Surface Chemistry	Dr. Somorjai	0.0	4.0
Inorganic Chemistry	Dr. Schleich	0.0	7.0
Supercritical Adsorber Columns	F. Seibert	0.0	4.2
Chemistry	D. Sawyer	8.0	0.0
Optical Components	A. Vanderlugt	7.0	7.3
Optical Processing	D. Casasent	4.0	0.0
Processing System	Dr. Fazzina	0.0	12.5
Alternate Adsorber	F. Seibert	4.0	0.0
Hydrate Technology	Dr. Sloan	0.0	2.0
Separator Design	Dr. Zenz	0.0	11.0
Structure Set		0.0	4.0
Process Modeling		0.0	8.0
Corrosion Research		3.0	0.0
Continuous Process	M. W. Kellogg	0.0	25.0
Extrusion Sigma/Beta	APV Baker	0.0	6.6

2026230326

PM USA R&D
1989-1990 Consulting Relationships
(Continued)

Program Description	Consultant	Budgeted Amount (\$000)	
		1989	1990
Supercritical Fluids	University of Texas	\$ 0.0	\$ 15.1
Binder Mechanisms	Dr. Ruben	6.3	0.0
Process Engineering	Notre Dame	<u>0.0</u>	<u>11.0</u>
Total		\$100.5	\$185.1

2026230327

VISITING SCIENTISTS

1990

<u>Scientist</u>	<u>Program</u>	<u>Amount</u>
Dr. Wegscheider	Optimization in Analytical Chemistry, Chemometrics, Information Theory Related to Analytical Data	\$ 20,000
Dr. Phillips	High Speed Calculation of Complex Physics and Engineering Systems	60,000
Dr. Pat Bower	Molecular Biologist (Miller Brewing)	22,055
	TOTAL	\$102,055

2026230328

Science and Technology Areas Currently Under Development at PM USA R&D

Molecular Biology	Modification of plant systems to eliminate the production of selected compounds (e.g., Nicotine).
Artificial Intelligence Systems	Expert system based computer models. Current work includes cigarette design systems.
Catalysts for CO oxidation.	Work with Seton Hall University to develop low temperature catalysts for CO oxidation.
Chemical energy sources.	Research at R&D and with N.Y. Polytechnic University to identify new heat sources for the Sigma Program.
Ceramic Technologies	Applications of sol-gels as cigarette paper fillers. Ceramic heater materials for the Beta Program.
Computer Simulations	Collaboration with Virginia Polytechnic Institute and State University to provide new insights into aerosol formation and the role of hydrates in tobacco expansion. Heat and mass transfer modeling for the Sigma Program. Flow and process simulations
Computer Technologies	High speed computing and machine communication. High performance workstations. Electronic information systems. Optical fiber networks.
Consumer Behavior Prediction	Psychophysical models of subjective response. Theories of market dynamics. Consumer testing methods.
Electrochemical Energy Sources	High energy/power density sources for the Beta Program.
Encapsulation	Release systems for menthol and/or flavors.
Fluid Jets	Accurate, high speed application of flavors or adhesives.
Monoclonal Antibodies	Rapid analysis for chemical and biochemical agents.

Natural Binders	Improved binder systems for tobacco or sheet materials.
Neural Computing	Neural network applications to complex mapping situations. (e.g. consumer preference from demographics)
Neutron Radiography	Thermal neutron imaging of cigarettes & smoke for product and/or combustion studies.
Nuclear Magnetic Resonance	High resolution tomographic imaging. Multiple pulse analysis techniques.
Optical Inspection	High speed imaging and analysis for real time product inspection. Work with Carnegie Mellon University on measurement of size, texture, connectedness, and color of disordered structures. Methods of foreign matter identification.
Paper	Development, using facilities at the University of Maine and Western Michigan University, of new paper and paper additive processes for the Paper Program.
Remote Sensing	Non-contact sensing of process and/or tobacco streams.
Separation Technologies	Supercritical fluid, membrane, fixed and fluidized bed separations of nicotine and/or minor alkaloids.
Supersonic Molecular Jets	Fundamental studies with Colorado State University of aerosol formation mechanisms and growth and chemistry of small organic clusters.
Tobacco Expansion.	R&D work on expansion mechanisms and technologies for improved expansion processes.

2026230330

Technology Assessment

The objectives of the R&D Technology Assessment effort remain to (1) define technology related needs, (2) identify areas of science or technology which may satisfy those needs, (3) develop those areas for our use and (4) recommend and facilitate the implementation of the technology. In pursuing those objectives we continue to maintain current awareness of numerous science and technology areas as they develop commercially or at universities. The Technology Assessment Group currently maintains contact with fifteen university departments, in addition to the contacts maintained by the R&D professional staff.

Activity continues in the three previously defined strategic technology areas:

Paper: The R&D Paper Program is making significant contributions to the basic understanding of sidestream smoke generation. During this plan period, the sol-gel work supported by this program is expected to provide new paper fillers for conventional as well as innovative smoking products.

Optical Inspection: The emphasis of the Optical Processing Program is currently on the implementation of commercially available hardware (and PM proprietary software) for on-line pack inspection as well as on-press inspection of printed materials. The recently initiated studies of optically implemented morphology operators are expected to yield technologies for inspecting tobacco filler and strip by the end of this plan period.

Artificial Intelligence: An expert system based cigarette design system has been implemented. This system is expected to contribute to R&D operations by expediting cigarette design operations and, ultimately, by reducing the number of semiworks runs. Neural computing technologies continue to develop rapidly and these have been adapted to PM uses. Recent success with the prediction of consumer response from demographic data suggests valuable applications for this technology during the next five years. The growth of artificial intelligence systems for on-line process control has been slower than anticipated. These may begin to be commercially available by the end of the plan period.

Other areas in which members of the R&D Technology Assessment Group are currently involved include:

Catalysts for CO oxidation: This work may produce PM proprietary catalysts for mainstream smoke or ambient air in 5 to 7 years.

2026230331

Chemical energy sources: Currently in use in the Sigma Program.

Computer simulations: Completed studies have enhanced our understanding of humectant systems. Current studies of hydrate and liquid drop formation are expected to make similar basic contributions to expansion and aerosol generation technologies.i

Electrochemical energy sources: These studies will continue to identify and develop energy sources for the Beta Program.

Supersonic Molecular Jet Studies: This work continues to provide basic information about the structure and chemistry during the initial stages of aerosol formation. Work aimed at increased understanding of formation mechanisms shows increasing promise.

Tobacco Expansion: New process design based on improved understanding of hydrate formation, and of blowing and fixing mechanisms is expected to produce improved expansion processes during the next 2 to 3 years.

These and similar programs will be continued into the plan period, with increased emphasis on identifying the specific needs of the R&D Major Programs. Continuing emphasis will be placed on the *implementation* of developed technologies.

2026230332

2026230333

APPENDIX D

Externally Developing Technologies

2026230334

SENSOR TECHNOLOGIES

Devices that provide a signal that accurately reflects some process parameter in real time.

Status:

Sensors with greatly improved selectivity, stability, sensitivity, precision, environmental resistance and range are under development at university, government and industrial laboratories. A major driving force for this development is "continuous process" applications in areas such as foods, beverages, materials, pharmaceuticals, chemicals, biochemicals, smelting, refining and waste management. Optical, electrical, acoustical and bio-sensors appear to be developing rapidly. Sensors for the non-visible regions of the electromagnetic spectrum are receiving less emphasis.

Likely Scenario:

The U. S. Department of Commerce projects a world sensor market of \$12B by the year 2000*. In that case we can expect that a multitude of new sensor technologies will become available during this plan period. New sensor technologies will be most readily applicable to liquid, rather than solid streams. Many of them will have short comings in real process situations (variable feedstocks, sensor lifetime, operational complexity, control system compatibility.) However useful new technologies will emerge. Considerations such as efficiency, quality, and inspection of new (novel) products will make these applications important to PM operations. In addition, biosensor development may lead to selective measurements of smoke components in room air and/or to more efficient analytical methods.

Alternate Scenario:

Reduced industry and government support for basic research may slow domestic development of these technologies.

Advances in the understanding of relationships between specific biological activity and chemical compounds could lead to the development of detectors for biological activity.

R&D Response:

We must continue to monitor a wide range of sensor development and to implement valuable technologies early as possible. While some of the new technologies will be directly

2026230335

applicable in their off-the-shelf form, many will need to be modified or developed for our uses. We must maintain enough internal activity in these areas to allow development and implementation with minimal learning time. This may be especially true in the case of the more specialized techniques such as biosensors or those using non-visible radiation.

A focused approach to the above activities is recommended. To the extent possible, future applications should be anticipated. Increased emphasis should be placed on establishing pathways and procedures for the smooth implementation of new or existing sensor technologies.

2026230336

ANALYTICAL SCIENCE & TECHNOLOGY

(See Also Sensor Technologies)

Methods and apparatus for the detection and measurement of specific chemical compounds-often for the detection and measurement of small concentrations of specific compounds in the presence of high concentrations of other compounds.

Status:

Analytical instrumentation and techniques are becoming progressively more sensitive, selective and specific. Major driving forces for these improvements are increased environmental and health concerns as well as increasing governmental regulation.

Likely Scenario:

Further reductions in the qualitative and quantitative detection limits for trace elements and organic compounds are expected to occur slowly during the plan period.

New instrumentation, software and detectors will make the measurements and identification easier.

The public will become more concerned about trace components in food and smoking products.

Alternate Scenario:

Major, as yet unknown, breakthroughs could lead to a significant stepwise reductions in limits of detection.

Government(s) may impose upper concentration limits on specific cigarette ingredients.

R&D Response:

Our current rate of acquisition of state-of-art analytical knowledge and instrumentation must be maintained. R&D must stay alert to all developments in analytical methodology and maintain readiness to implement those which impact R&D, Operations or defensive needs.

To facilitate the development of analytical strategies, we should seek better understanding of the origins of (and synergies between) the materials we analyze.

2026230337

BIOTECHNOLOGY

Modification of the genetic machinery of living cells to alter the chemical or physical nature of the organism or to produce useful biochemicals. The production of high value-added biological products on a commercial scale.

Status:

Biotechnology has produced plant modifications, biosensors, new and efficient separation and purification methods, new or better techniques to produce natural and/or new biochemicals and more efficient bioprocesses. Commercial applications have been hampered by difficulties in controlling large scale bio-processes and making large scale separations. More fundamental problems center on needs for measurement tools and for improved knowledge of cellular processes and protein structure/function relationships.*

Likely Scenario:

Biotechnology markets in pharmaceuticals, foods, flavors, fragrances, agrichemicals, commodities, fuels and pollution abatement are estimated by the U.S. Department of Commerce to reach a world market of \$40B by the year 2000*.

The market for modified tobacco plants is probably too small and fragmented to attract commercial interest outside of tobacco companies. However the external development of biopesticides, drought resistant plants or "natural" anti-suckering agents may contribute to tobacco quality and/or production. Japan Tobacco Inc. is known to be developing a broad base of biotechnology, not necessarily related to tobacco or smoking product applications.

Recent demonstrations of the use of bacteria to install traits of interest into specific plants suggest the possibility of introducing or inhibiting a specific physical characteristic or a chemical component. Since the bacteria die with the plants, the traits are not passed on to future generations and no permanent alteration of the environment is effected. Thus traits of interest could be installed by the farmer, using a spraying operation. Further development of this technology is highly probable.

Alternate Scenario:

Breakthroughs in the fundamental understanding of biochemical structure/function relationships could produce radical changes in the nature and effectiveness of biotechnology.

2026230338

PM Response:

As one of the fastest growing areas of science, biotechnology demands our continuing attention. R&D is pursuing the use of anti-sense techniques to reduce or eliminate the expression of specific products (alkaloids) in tobacco. We are actively investigating the new results (above) in the use of bacteria or viruses for the transient expression of desirable traits (reduced alkaloids, improved flavor.) Work is also in progress on the enzyme degradation of nicotine in gas or aqueous streams.

Members of the Biochemical Research Division continually monitor developments in biotechnology. These include homologous recombination (gene alteration), the use of microorganisms to introduce biopesticides and methods of gene introduction such as "gene guns," or microinjection techniques.

2026230339

HIGH PERFORMANCE COMPUTING

The design and development of computer architectures for rapid and efficient processing. Development of ways to program large systems to perform complex tasks.

Status:

Continuing and significant advances in the areas of software engineering, microelectronics, optoelectronics, data structures and algorithms, numeric and symbolic methods and computational science and technology have pushed computer performance to unanticipated levels. High performance computers can now address large numerical and scientific problems such as image processing, weather forecasting, hydrodynamics, aerodynamics, computational chemistry and high energy physics. Current problems lie in reliability, accuracy and automated development. Software is difficult to specify and design, development is costly and time consuming and it is difficult to test for all failure modes that might occur during use*.

Concurrently with advances in mainframe machines, desktop computers have evolved which offer performance approaching that of the mainframes of a few years ago. Networks of these "workstations" are creating a new working environment for technical personnel.

Likely Scenario:

Rapid advances in computer technology are expected to continue. The U.S.D.O.C. estimates a \$100B world market by the year 2000*. Low cost "supercomputer modules" may be available within two years. Existing applications programs will be able to solve previously intractable problems in such areas of machine vision, product design, process simulation and complex numerical calculations. Given the slower pace of applications development, a moderate number of new solutions will be developed and applied to current problems. The application of real time process control will be limited by our understanding of the relationships between sensor information and control parameters, rather than by computational speed. Non-Van Neumann (fuzzy logic, neural computing) approaches will continue to grow in importance as computational speed increases. While optical coupling will be necessary for high speed processors, optical computing (optical transform operations, optical logic) will progress slowly and will find its primary use in military applications. Computer aided cigarette design will continue to improve and will be widely available by the end of the plan period.

Advances in desktop workstations are expected to continue, further enhancing the ability of technical personnel to control powerful local computing environments as well as to communicate with other workstations or mainframe machines.

2026230340

Alternate Scenario:

In principle, the field of optical computing offers extreme speed and the possibility of creating complex architectures with minimal crosstalk. If "conventional" architectures fail to continue their rapid progress, increased emphasis will be placed upon optical computing. Such emphasis could also result from a breakthrough in monolithic optical technology.

R&D Response:

The monitoring and application of technologies such as process simulation, machine vision, computational physics/chemistry neural simulation and artificial intelligence must be continued, and supported by high performance computing capability.

A more focused approach should be taken to the definition and analysis of computational problems in terms of the potential benefits from their solution. The growth of workstation environments at R&D should be continued when their use makes "business sense." Additional effort should be devoted to understanding the relationships between sensor information and control parameters. Opportunities to apply this understanding should be addressed in collaboration with other departments.

Progress in the optical processing/computing areas should be followed closely. R&D should maintain enough activity in these technologies to be able to quickly understand and implement them should the need arise.

2026230341

INNOVATIVE SMOKING ARTICLES

Articles which employ novel approaches to offer the satisfaction of smoking, accompanied by perceived health or social benefits.

Status:

An innovative article employing a carbon heat source was introduced in test market by R. J. Reynolds Tobacco and subsequently withdrawn. Reynolds has indicated plans to introduce these articles in Europe. Other tobacco companies are investigating this area. Non-tobacco companies (including Proctor and Gamble) may also have an interest.

Likely Scenario:

It is likely that either a tobacco company or a drug company will introduce an innovative smoking or aerosol inhalation device to the market during the plan period. It could be reasonably successful.

Alternate Scenarios:

Consumer product or drug companies may (1) be unable to develop an acceptable product or (2) judge the market to be unacceptable. In that case, there will be no introductions of novel devices.

Or, several consumer product or consumer electronics companies may introduce devices, making the products a "commodity."

R&D Response:

We must continue our product development activities aimed at initial introductions in 1992-93 and at the marketing of a technologically advanced "ultimate" product by 1999.

We must also continue careful monitoring of developments to avoid technical or business surprises. Technologies for small electrical storage devices with high energy/power capability and for the high speed manufacture of heater arrays will be particularly important.

2026230342

FARM AUTOMATION

Mechanized farm practices designed to reduce labor requirements.

Status:

Agricultural economics increasingly dictates a need for farm consolidation and increased mechanization (reduced labor.)

Likely Scenario:

Increased automation will be necessary to maintain the profitability of tobacco farming. Automated mechanical harvesting is likely to increase the quantity of poorly graded or mixed tobacco offered for auction. Thus PM would lose some of its capability to purchase well graded (by stalk position) tobacco. This may reduce our control of blend components for cigarette making.

Alternate Scenario:

Poorly designed or applied automated equipment could result in a general reduction in tobacco quality.

R&D Response:

We are currently working in a cooperative program with state and federal tobacco researchers and extension personnel to keep them aware of the need for quality, well graded tobaccos.

2026230343

OPTICAL INSPECTION TECHNOLOGIES

Technologies which allow materials, products and packaging to be inspected at manufacturing speeds for defects that would be visually apparent to an observer, given sufficient observation time.

Status:

Only a few years ago the real time inspection of our products was not feasible using digital imaging technology. At that time optical processing (using optical transforms and/or optical computing) was the technology of choice. However recent developments in high speed cameras, high volume information storage, high speed computing and computing algorithms have made on-line package inspection possible and placed individual cigarette and on-press print inspection within reach. The current technical challenges center on the reproducible and stable presentation of objects to the camera and on the development of very high resolution, high speed cameras or electrooptic scanners.

Likely Scenario:

Developments in digital imaging are expected to continue, driven by an estimated \$5B world market (\$3.3-4.3B U.S.) by the year 2000*. We anticipate the installation of pack inspection systems on all modules by 1992. Imaging and processing capabilities for print web and 100% on line cigarette inspection are expected to be available by 1994. Adaptation of these developments to our applications will produce significant benefits in quality and machine utilization.

Developments in morphological image processing are expected to lead to on-line methods of characterizing tobacco streams (size, shape, texture, color) and the identification of foreign materials.

Alternate Scenarios:

Very high speed inspection is needed by relatively few industries (cigarettes, beverages, pharmaceuticals and printing.) These markets may not be sufficient to motivate commercial development of high speed systems.

Unexpected technical barriers may preclude the attainment of the required speeds and resolution by digital technologies - or unexpected breakthroughs may occur in optical processing or computing.

2026230344

R&D Response:

Continued or expanded effort is needed to achieve the goal of 100% pack inspection and to develop or adapt high speed imaging and processing to our needs. Close coordination between R&D and Engineering will be necessary.

The development of digital imaging technologies must be monitored closely, as must the business progress of the (generally small) vision system vendors. We should stay abreast of progress in the optical processing/computing areas in the event that optical implementations prove necessary or desirable.

Recently initiated sponsored research in morphological processing (Carnegie Mellon University) should be followed closely to determine the potential of this technology for tobacco inspection.

2026230345

AUTOMATION AND PROCESS CONTROL

Technologies to carry out tasks or operate machinery with minimal dependence on human operators.

Status:

Over the past ten years, progress in these technologies has been slower than anticipated. However increasing needs to reduce manpower, increase quality and improve machine utilization are leading to more emphasis in the area. At the same time developments in computer science and technology have made successful real time implementations more feasible.

Likely Scenario:

During the plan period, controller and sensor technologies are expected to mandate "host" computer strategies. Real time data collection will become routine with statistical processing done on a plant wide basis (host environment.) On-line applications of artificial intelligence, neural processors and fuzzy logic process control will develop slowly and may become significant near the end of the plan period.

Alternate Scenarios:

A significant process control need (such as the manufacture of novel smoking articles) may develop requiring us to adapt or develop currently emerging technologies.

Aa significant breakthrough in process control theory or technology may occur to expedite the appearance of new commercial equipment.

Developments in smart sensors and controllers (local processors) may provide flexibility and simplicity, but no central control or statistical use.

R&D Response:

Developments should be closely monitored and evaluated for our applications as early as possible. Smart sensors, artificial intelligence and neural systems are currently under study. It is important that we develop better mechanisms for understanding and evaluating process control problems and implementing solutions.

2026230346

BIODEGRADABLE AND RECYCLABLE MATERIALS

Discarded biodegradable product and packaging materials are converted to environmentally acceptable physical and/or chemical forms by the action of sunlight or natural microorganisms. Recyclable materials may be reprocessed for further use.

Status:

Packaging is seen by the public as a major factor in the growing solid waste disposal crisis. Steadily increasing public concern has resulted in significant increases in research efforts to produce recyclable and biodegradable polymer materials. Biodegradable materials may be converted to a more dispersible physical form by microbial action (as by incorporating starch), substantially metabolized (as in the case of new cellulose-based materials) or degraded by sunlight or enzymatic action to more acceptable chemical forms. While most polymers can, in principle, be reprocessed for further use, problems arise in the identification and sorting of waste materials or, in the case of layered or co-polymers, in separating mixtures into their component parts. While products in all categories are beginning to appear, many of these efforts are in their initial stages.

Likely Scenario:

Continued rapid growth in public demand for biodegradable or recyclable materials is expected, fueled by environmental and conservation concerns. More than 70% of landfills are expected to be closed within five years. Anti-smoking forces may support demands for biodegradable films, packages and filters. Thus biodegradable/recyclable package and product components will become important product attributes during the plan period.

Alternate Scenario:

National or state legislation may be passed requiring the use of degradable or recyclable materials and/or restricting the release of specific packaging components to the environment.

R&D Response:

A coordinated program to monitor all developments in this area is essential. New developments should be identified at the earliest stage and developed for our use as quickly as possible. Areas of potential importance include biodegradable filter materials, biodegradable/recyclable packaging and the utilization of recycled materials in our packaging. Analytical tools for the identification of packaging components should be reviewed and updated as necessary.

WASTE AND EMISSIONS MANAGEMENT TECHNOLOGIES

Technologies associated with reducing the production, or disposing of liquid, solid or gaseous waste materials.

Status:

Increasing environmental concerns are resulting in a proliferation of rulings from government agencies. These span the range from specific compound emissions through storage requirements and the disposal of solid and liquid waste streams. Landfills are rapidly being eliminated, waste water and volatile emissions are under increasing scrutiny.

Likely Scenario:

These concerns are expected to increase. Government controls on organic, toxic and "irritant" emissions will increase. Landfills and hazardous waste landfills will close, while controls on hazardous waste transport and disposal will increase. Restrictions on waste water will be increased; additional standards may be set for particular elements or compounds.

R&D Response:

The PM USA Environmental Health and Safety Plan for 1991-95 addresses numerous issues specific to PM and defines strategies and action plans for each. While many phases of this plan may require R&D involvement, the following are set forth explicitly:

Research on the degradation of identified emissions.

Implementation of further tobacco treatment with Kabat.

Continued research on processes to reduce current volatile emissions.

Evaluate laboratory procedures to find ways of minimizing hazardous waste generation.

Evaluate methods to remove sand from tobacco prior to processing.

Develop and implement a pre-treatment system to dispose of process waste at Bermuda Hundred.

Identify unregulated materials for which internal standards should be developed.

2026230348

Update annually the "acceptable pesticides" list.

Implement written programs for pesticide management.

Establish tobacco conditioning cycles for obtaining Phyto certificates.

2026230349

CHEMICAL SENSES

This area can be operationally defined as "the development of a fundamental understanding of those physical/chemical and biological system interactions that result in subjective response to a product." The senses of primary interest include taste, odor, feel (e.g. trigeminal), vision and the role of cognitive factors (e.g. consumer expectancy). The levels of interest encompass single compounds, mixtures, receptors, biochemistry, physiology, cognition evaluation, study designs, testing and hypothesis evaluations.

Status:

Technological and marketing factors have prompted increased activity in the chemical senses areas by consumer goods manufacturers. Activities noted in the literature range from fundamental mechanism and physiology studies through the development of new consumer testing tools.

Likely Scenario:

We believe that fundamental understanding in this area will increase rapidly during the plan period, augmented by the increasing power of computers to identify chemical configurations and model complex systems. Consumer applications will follow quickly. Philip Morris' competitors are known to be active in this area.

Alternate Scenarios:

A breakthrough in fundamental understanding could lead quickly to the development of unique new products - perhaps by our competitors.

The identification of specific chemical species which are critical to subjective response could result in selective filters for those species.

R&D Response:

Proposed responses are discussed elsewhere in this plan (sec. ???.) Briefly, our initial response must be to clearly define our objectives in this area in order to design studies or acquire tools which will lead to the timely development of product improvements.

2026230350

* Emerging Technologies - A Survey of Technical and Economic Opportunities, Technology Administration, U.S. Department of Commerce, Spring 1990.

2026230351

2026230352

Appendix E

APPENDIX E

Strategic Technologies

2026220353

STRATEGIC SCIENCE AND TECHNOLOGY ITEMS

Table 1: Listed by Major R&D Program

Table 2: Listed by Science or Technology - For items which support two or more programs.

2026230354

TABLE I
STRATEGIC SCIENCE AND TECHNOLOGY ITEMS
LISTED BY MAJOR R&D PROGRAM

key: A=well developed externally
B=emerging/developing externally
C=no known external development

AMBROSIA

<u>Paper Coating</u> technologies	A
<u>Chemical Senses</u> - Means to mask or synergistically cancel aroma or taste.	B
<u>Encapsulation Technology</u>	B
<u>Paper-Additive Interactions</u> - Means to predict the stability of aroma compounds on paper	C
<u>Combustion Physics & Chemistry</u> - Decomposition routes & products	C
<u>Basic Research Support</u>	
Consumer Testing	
Flavors	

ART

<u>Selective Separation</u> technologies	B
<u>Simulation & Modeling</u> of ART processes	B
<u>Chemical Senses</u> - Means to simulate the "impact" of nicotine.	C
<u>Nicotine Disposal</u> technologies	B
<u>Thermodynamics and Kinetics</u> of nicotine-tobacco system	C
<u>Continuous Feed Technologies</u> - in/out of high pressure systems	C
<u>Basic Research Support</u>	
Biological	
Computing	
Consumer Testing	
Flavors	
Separations	

CAST SHEET

<u>Casting and Drying</u> technologies	A
<u>Release Compounds/Technologies</u>	B
<u>Binder Formulation</u>	C
<u>"Microbubble" Technology</u> - for modifying sheet character	C
<u>Extrusion Technologies</u> - for cast sheet	C
<u>Basic Research Support</u>	
Biological	
Combustion Physics & Chemistry	
Flavors	

2026230355

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

DOMESTIC PRODUCT SUPPORT

This program area implements developed technologies which result from the other program areas.

EXPANDED PRODUCT

<u>Simulation & Modeling</u> - of two phase flow	A
<u>Machine Design</u> - maker for low density products	B
<u>Thermodynamics and Kinetics</u>	
- of CO ₂ / tobacco interactions	C
- of tobacco thermal treatment	C
- of Kabat loss during processing	C
<u>Continuous Feed Technologies</u> - in/out of pressurized systems	C
<u>Binder Technology</u>	C

Basic Research Support

Combustion Physics & Chemistry
Computing
Flavors

FILTER R&D

<u>Filter Fabrication</u> - in-house facility/expertise	A
<u>Chemical Senses</u> - identity of important flavor components	B
<u>Combustion Physics & Chemistry</u> - flavor component generation	C

Basic Research Support

Aerosols
Catalysis
Computing
Consumer Testing
Flavors
Selective Filtration

INTERNATIONAL PRODUCTS

<u>Combustion Physics & Chemistry</u> - methods for improving the smoking characteristics of stems	C
--	---

This program area primarily implements developed technologies which result from the other program areas.

A need to support existing (older) technologies in in South American factories was expressed, but this may not be an R&D program need.

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

LBA:

<u>Tumor Promotion Assays</u> - Short-term in vitro	B
<u>Cellular Detoxification and Toxification</u>	B
<u>Macromolecular Adduct Assays</u> - DNA & protein	B
<u>Oncogene Assays</u>	B
<u>Genetic Susceptibility Markers</u> (RG genes, etc.)	B
- role of cellular messengers other	B
biologically reactive species	
<u>Biochemistry</u> - role of NO _x in cellular reactivity	C
 <u>Basic Research Support</u>	

Biological
 Combustion Physics & Chemistry
 Separations

LOW TAR HIGH TASTE and
REDUCED TAR AND NICOTINE

<u>Chemical Senses</u>	B
<u>Smoke Chemistry</u> - Flavor generation mechanisms	C
<u>Filtration Mechanisms</u> - Means for selective separation of vapor phase components	C
<u>Simulation & Modeling</u> - to predict delivery of critical flavor components from cigarette parameters	C
<u>Flavor Release Technologies</u> - for releasing flavors from filters	B

Basic Research Support

Aerosols
 Biological
 Combustion Physics & Chemistry
 Consumer Testing
 Flavors
 Separations

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

2026230357

OPERATIONS SUPPORT

<u>Polymer Characterization Technology</u> - Methodology for characterizing high molecular weight materials.	A
<u>Environmental Sample Processing</u> - methods, facility and in-house expertise	A
<u>Statistical Analysis/Experimental Design</u> - resident in the Analytical Research Division	A
<u>"Forensic Chemistry"</u> - expertise in determining probable causes of product problems	A
<u>Chemical Senses</u> - for relating analytical and subjective results	B
<u>Analytical Databases</u>	B

Basic Research Support

- Computing
- Entomology
- Measurement and Sensing
- Microbiology

OPTICAL PROCESSING

<u>Algorithm Concepts & Development</u>	B
<u>High Speed Processing</u> (computing) technologies	B
<u>High Speed Scanning</u> (camera) technologies	B
<u>High Speed Presentation</u> technology & hardware	C

Basic Research Support

- Computing
- Measurement and Sensing

PAPER/SIDESTREAM

<u>Particle Morphology Measurement/Classification</u>	B
<u>Analysis Techniques</u> - Real time analysis of sidestream smoke	B
<u>Catalysis</u> for conversion of gas phase components	B
<u>Selective Filtration</u> - objectional taste/aroma elements	C
<u>Chemical Senses</u> - subjective-analytical correlations	B
<u>Filler-Fiber Interactions</u> in papers	C

Basic Research Support

- Aerosols
- Combustion Physics & Chemistry
- Consumer Testing
- Flavors
- Measurement and Sensing

2026230358

PACT

Aerosols
Catalysis
Consumer Testing
Measurement and Sensing

TSNA

Biological
Combustion Physics & Chemistry
Separations.

2026230360

TABLE II
AREAS OF SCIENCE OR TECHNOLOGY IMPORTANT TO TWO OR MORE R&D MAJOR PROGRAMS

key: A=well developed externally
B=emerging/developing externally
C=no known external development

ANALYSIS TECHNIQUES

<u>Paper/Sidestream</u> - Real time analysis of sidestream smoke	B
<u>PACT</u> - Analysis of extremely low concentrations of organic vapors	A

BINDER TECHNOLOGY

<u>Cast Sheet</u> - Binder formulation	C
<u>Expanded Product</u> - Low density product	C

CATALYSTS

<u>Paper/Sidestream</u> - Gas phase conversion	B
<u>PACT</u> - CO removal from ambient air	B
<u>Tomorrow</u> - CO reduction in low porosity product	B
<u>TSNA</u> - Decomposition of TSNA's	C

CHEMICAL SENSES

<u>Ambrosia</u> - Means to mask or synergistically cancel aroma or taste	B
<u>Filter R&D</u> - Identify important flavor components	B
<u>Low Tar High Taste</u> - Important flavor components	B
<u>Operations Support</u> - Relationship of analytical and subjective results	B
<u>Paper/Sidestream</u> - Relationship of analytical and subjective results	B
<u>ART</u> - Simulation of nicotine impact	C

COMBUSTION PHYSICS & CHEMISTRY

<u>Ambrosia</u> - Generation of taste/odor components	C
<u>Filter R&D</u> - Flavor component generation	C
<u>International Products</u> - Improved taste from stems	C
<u>Low Tar High Taste</u> - Flavor generation mechanisms	C
<u>Tomorrow</u> - Reduced combustion energy	B
- Heat absorbing compounds	B
- Insulating wrappers/fillers	B
<u>TSNA</u> - Pyrosynthetic pathways	C

2026230361

key: A=well developed externally
 B=emerging/developing externally
 C=no known external development

CONTINUOUS FEED TECHNOLOGIES

<u>ART &</u>	- Tobacco movement in and out	C
<u>EXPANDED PRODUCT</u>	of pressurized systems	

MACHINE DESIGN

<u>EXPANDED PRODUCT &</u>	- Maker for low density products	B
<u>TOMORROW</u>		

SELECTIVE SEPARATIONS

<u>ART</u>	- Selective extractions	B
<u>TSNA</u>	- Solvent/co-solvent effects	B
	- Solubility modification	B

SIMULATION AND MODELING

<u>Expanded Product</u>	- Modeling of two phase flow	A
<u>ART</u>	- Simulation of extraction process	B
<u>Tomorrow</u>	- Models of - Fabric ignition	B
	- Heat generation & transmission	B
<u>Low Tar High Taste</u>	- Predict delivery of flavor components	C

THERMODYNAMICS & KINETICS OF CHEMICAL SYSTEMS

<u>ART</u>	- Nicotine-tobacco system	C
<u>Expanded Product</u>	- CO-tobacco system	C
	- Thermal treatment of tobacco	C

2026230362

Appendix F

2026230363

APPENDIX F

PM USA R&D Patents and Publications

2026230364

PHILIP MORRIS PATENTS

July, 1989 - July, 1990

2026230365

I. FILTER TECHNOLOGY

2026230366

United States Patent [19]

Patron et al.

[11] Patent Number: 4,848,375

[45] Date of Patent: Jul. 18, 1989

[54] FILTER CIGARETTE

[75] Inventors: Gregorio L. Patron, Midlothian;
Walter A. Nichols; Paul N. Gauvin,
both of Richmond; Francis M.
Sprinkel, Jr., Glen Allen, all of Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 119,047

[22] Filed: Nov. 10, 1987

[51] Int. Cl.⁴ A24D 3/04; A24D 3/06

[52] U.S. Cl. 131/335; 131/336;
131/198.2

[58] Field of Search 131/335, 336, 198.1,
131/198.2

[56] References Cited

U.S. PATENT DOCUMENTS

2,954,035 9/1960 Saffir .
3,016,902 1/1962 Lipp et al. .
3,359,988 12/1967 Thomson .
3,428,050 2/1969 Kandel .
3,463,166 8/1969 Bennett et al. .

3,515,146 6/1970 Nealis .
3,596,665 8/1971 Lindgard .
4,532,943 8/1985 Nichols et al. .
4,649,944 3/1987 Houck, Jr. et al. .
4,677,995 7/1987 Kallianos et al. .

FOREIGN PATENT DOCUMENTS

1058343 2/1967 United Kingdom .
1095848 12/1967 United Kingdom .

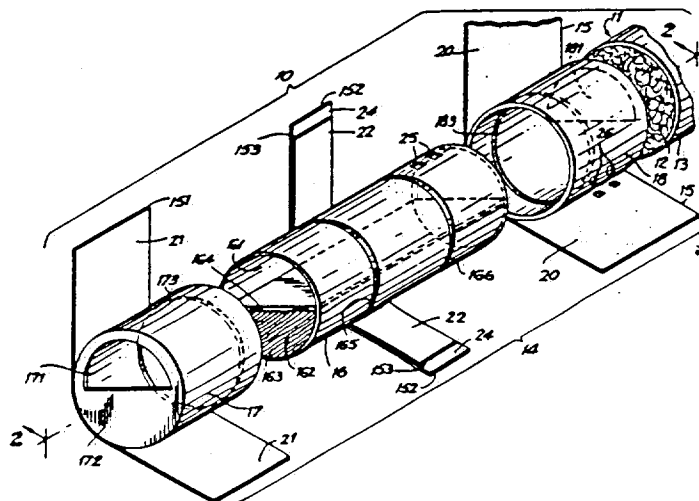
Primary Examiner—Vincent Millin

Attorney, Agent, or Firm—Jeffrey H. Ingberman

[57] ABSTRACT

A filter cigarette is provided in which the smoker can select different flavorants or filter media for interposition in the smoke stream. A filter segment having two flow paths, each containing different flavoring or filtering media, cooperates with one or two rotatable end caps having openings for selective registration with the flow paths, are used to select the desired flow path. A method of delivering "air-swept flavor" is also provided.

34 Claims, 4 Drawing Sheets



2026230367

United States Patent [19]
Sprinkel Jr.

[11] Patent Number: 4,869,276
[45] Date of Patent: Sep. 26, 1989

- [54] HINGED FILTER SLEEVE
[75] Inventor: Francis M. Sprinkel Jr., Glen Allen, Va.
[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 89,445
[22] Filed: Aug. 26, 1987

- [51] Int. Cl.⁴ A24D 3/04
[52] U.S. Cl. 131/361; 131/336
[58] Field of Search 131/336, 342, 365, 361, 131/362

[56] References Cited

U.S. PATENT DOCUMENTS

- 973,890 10/1910 Surbrug .
2,226,473 12/1940 Kennedy .
2,881,770 4/1959 Touey 131/342
3,189,032 6/1965 Brothers .
3,205,791 9/1965 Goodfellow et al. .
3,490,461 1/1970 Osmalov et al. .
3,524,450 8/1970 Molins .
4,256,122 3/1981 Johnson 131/336
4,498,487 2/1985 Frattolillo .
4,542,754 9/1985 Cantrell et al. .

- 4,553,556 11/1985 Lephardt .
4,582,071 4/1986 Westcott et al. .
4,614,199 9/1986 Berger 131/336
4,620,557 11/1986 Cantrell et al. .
4,637,409 1/1987 Berger 131/336
4,646,762 3/1987 Riehl et al. .
4,649,942 3/1987 Horsewell et al. 131/336

FOREIGN PATENT DOCUMENTS

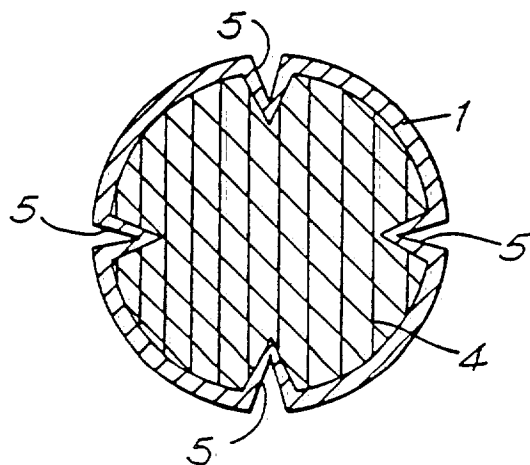
- 1027901 5/1953 France .
1110914 4/1968 United Kingdom .

Primary Examiner—V. Millin
Attorney, Agent, or Firm—Eric M. Lee

[57] ABSTRACT

A filter cigarette is provided with a filter assembly having a substantially tubular sleeve with at least one hinge formed in the periphery of the substantially tubular sleeve. The hinge causes the sleeve to be resilient in the radial direction which allows the sleeve diameter to decrease and increase so that the radii of the tobacco rod and filter assembly can be properly matched and the tipping material can be tightly wrapped around the filter assembly.

6 Claims, 1 Drawing Sheet



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

DEC 11 1989

United States Patent [19]
Hill et al.

[11] Patent Number: 4,925,602
[45] Date of Patent: May 15, 1990

- [54] METHOD FOR IMPROVING THE
CRIMPING OF POLYOLEFIN FILTER TOW
- [75] Inventors: Michael Hill, Ascot, England;
Walter A. Nichols, Richmond, Va.
- [73] Assignee: Filter Materials Limited, New York,
N.Y.
- [21] Appl. No.: 231,148
- [22] Filed: Aug. 10, 1988
- [51] Int. CL⁵: D01D 5/22; D01D 5/42
- [52] U.S. CL: 264/25; 264/26;
264/147; 264/168; 264/563; 264/DIG. 47
- [58] Field of Search: 264/DIG. 47, 563, 25,
264/26, 147, 168; 28/257

[56] References Cited

U.S. PATENT DOCUMENTS

- 2,914,810 12/1959 Robinson et al. 19/66
3,336,174 8/1967 Dyer et al. 264/DIG. 47
3,398,441 8/1986 Adachi et al. 264/DIG. 47
3,494,522 2/1970 Kim et al. 225/97
3,495,752 2/1970 Kim et al. 225/3
3,496,260 2/1970 Guenther et al. 264/156
3,500,517 3/1970 Dekker et al. 28/1.5
3,500,518 3/1970 Stanley et al. 28/1.6
3,500,627 3/1970 Kim 57/140
3,526,349 9/1970 Moro 225/97
3,565,308 2/1971 Slack 225/97
3,566,735 3/1971 Greene 83/344
3,577,724 5/1971 Greene 57/157
3,579,618 5/1971 Stewart et al. 264/DIG. 47
3,582,418 6/1971 Schuur 264/DIG. 47
3,595,454 7/1971 Kalwaites 225/3

- 3,726,079 4/1973 Feild et al. 57/155
3,739,053 6/1973 Yazawa 264/154
3,756,484 9/1973 Guenther 225/97
3,787,261 1/1974 Heger et al. 156/84
3,801,252 4/1974 Waterhouse 425/304
3,835,513 9/1974 Stanley 28/72.14
3,880,173 4/1975 Hill 131/269
3,883,936 5/1975 Stanley 28/72.14
3,927,957 12/1975 Chill et al. 425/131.1
3,949,454 4/1976 Irwin 28/72.14
3,985,600 10/1976 Blais 156/229
3,985,933 10/1976 Mehta et al. 428/357
4,129,632 12/1978 Olson et al. 264/40.1
4,133,087 1/1979 Li 28/257
4,133,088 1/1979 Hikobe 264/DIG. 47
4,134,951 1/1979 Dow et al. 264/147
4,273,600 6/1981 Luke 156/180

FOREIGN PATENT DOCUMENTS

- 971878 10/1964 United Kingdom
1207733 10/1970 United Kingdom
1260957 1/1972 United Kingdom
1339496 12/1973 United Kingdom

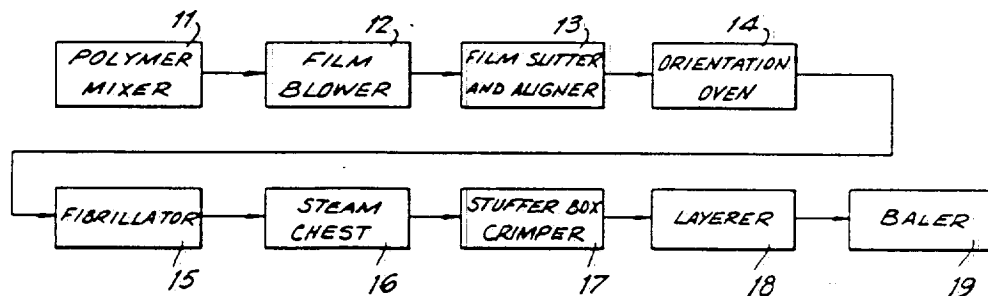
Primary Examiner—James Lowe

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

A method is provided for heating fibrillated polyolefin film prior to crimping, to improve the crimping, and thus the yield and variability as a filter, of the tow. The fibrillated tow is crimped while still hot from the heating step. The resulting fibers have more uniform crimping at higher levels than those not subject to heating.

19 Claims, 2 Drawing Sheets



II. FLAVOR TECHNOLOGY

2026230370

United States Patent [19]

Williams et al.

[11] Patent Number: 4,859,775

[45] Date of Patent: Aug. 22, 1989

[54] PROCESS FOR PREPARING ACYLPYRAZINE ETHERS

[75] Inventors: David L. Williams; Everett W. Southwick; Yoram Houminer, all of Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 27,547

[22] Filed: Mar. 18, 1987

Related U.S. Application Data

[62] Division of Ser. No. 782,545, Oct. 1, 1985, Pat. No. 4,728,738.

[51] Int. CL⁴ C07D 241/16; C07D 241/18;
C07D 405/12

[52] U.S. CL. 544/405; 131/278;
544/406

[58] Field of Search 544/405, 406; 131/278

[56] References Cited

U.S. PATENT DOCUMENTS

2,677,686	5/1954	Smith et al.	131/278
3,402,051	9/1968	Roberts	131/278
4,535,791	8/1985	Williams et al.	131/278
4,728,738	3/1988	Williams et al.	544/405

FOREIGN PATENT DOCUMENTS

119718 9/1984 European Pat. Off. 131/278
148788 7/1985 European Pat. Off. .

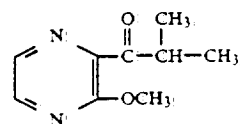
OTHER PUBLICATIONS

Karnas et al., J.A.C.S., vol. 74 (1952), pp. 1580-1584.
March, Advanced Org. Chem., 3rd Ed., p. 645.
Solomons et al., Org. Chem., 3rd Ed., pp. 671-672.
Williams et al., Chem. Abst., vol. 103 (1985), 157636e.

Primary Examiner—Cecilia Shen

[57] ABSTRACT

In one of its embodiments the present invention provides a smoking composition which contains a novel type of acylpyrazine ether flavorant additive as exemplified by 1-(3-methoxy-2-pyrazinyl)-2-methyl-1-propanone.



6 Claims, No Drawings

2026230371

United States Patent [19]

Howe et al.

[11] Patent Number: 4,872,917

[45] Date of Patent: Oct. 10, 1989

[54] SCLARAL ALKYL ETHERS AND SMOKING COMPOSITIONS CONTAINING A SCLARAL ALKYL ETHER FLAVORANT

[75] Inventors: Charles R. Howe; Everett W. Southwick, both of Richmond; Richard H. Cox, Midlothian, all of Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 818,452

[22] Filed: Jan. 13, 1986

[51] Int. Cl.⁴ A74B 3/12

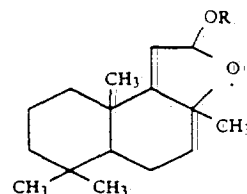
[52] U.S. Cl. 131/275; 131/276; 131/277

[58] Field of Search 131/275, 276, 277, 278

Primary Examiner—V. Millin

[57] ABSTRACT

This invention provides novel sclaral alkyl ether compounds, and smoking compositions which contain a sclaral alkyl ether compound as a flavorant additive.



Under cigarette smoking conditions the sclaral ether is a volatile component which enhances the flavor of the mainstream smoke and the aroma of sidestream smoke.

13 Claims, No Drawings

2026230372

United States Patent [19]

Podraza et al.

[11] Patent Number: 4,872,918

[45] Date of Patent: Oct. 10, 1989

[54] HETEROCYCLIC ESTERS AND SMOKING COMPOSITIONS CONTAINING A HETEROCYCLIC ESTER FLAVORANT-RELEASE ADDITIVE

[75] Inventors: Kenneth F. Podraza; Yoram Houminer, both of Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 861,945

[22] Filed: May 12, 1986

[51] Int. Cl.⁴ A24B 3/12; A24B 15/36

[52] U.S. CL 131/277; 131/278; 131/279

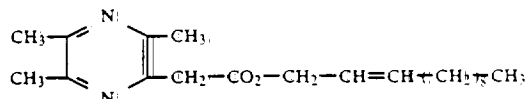
[58] Field of Search 131/277, 278, 279

Primary Examiner—V. Millin

[57] ABSTRACT

This invention provides novel heterocyclic ester com-

pounds. This invention further provides smoking compositions which contain an invention heterocyclic ester as a flavorant-release additive, as illustrated by the following structure:



Under normal cigarette smoking conditions, tetramethylpyrazine and an olefin are released as pyrolysis products, and they enhance the flavor and aroma of the mainstream and sidestream smoke.

24 Claims, No Drawings

RECEIVED
PHILIP MORRIS MANAGEMENT CORP
LAW DEPT.—PATENT SECTION

DEC 18 1989

NOTED: _____

2026230373

United States Patent [19]

Williams et al.

[11] Patent Number: 4,925,985

[45] Date of Patent: May 15, 1990

[54] PROCESS FOR THE PRODUCTION OF
4,6-DIMETHYL-7-HYDROXYNONAN-3-ONE

[75] Inventors: David L. Williams; William B. Edwards, III, both of Richmond; Richard H. Cox; Daryl L. Faustini, both of Midlothian; Surnease Drew, Richmond, all of Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 266,162

[22] Filed: Nov. 2, 1988

[51] Int. CL³ C07C 45/67

[52] U.S. CL. 568/384; 568/386; 568/392; 568/404; 560/266; 558/435; 558/440; 549/356

[58] Field of Search 568/386, 384, 392, 404; 560/266; 558/435, 440; 549/356

[56] References Cited

U.S. PATENT DOCUMENTS

4,317,836 3/1982 Chuman et al. 568/414

OTHER PUBLICATIONS

Ono et al., Agric. Biol. chem., vol. 44, pp. 2259-2260 (1980).

Chuman et al., Agric. Biol. Chem., vol. 46, pp. 593-595 & 3109-12 (1982).

Mochiguki et al., Agric. Biol. Chem., vol. 48, pp. 2833-2834 (1984).

Mori et al., J. chem. Ecology, vol. 12, pp. 83-89 (1980).

Levinson et al., Naturwissenschaften, #73, S36(1986).

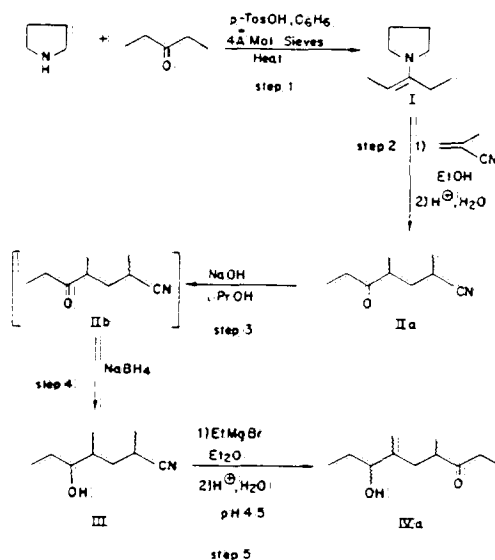
Chuman et al., J. Chem., Ecology, vol. 11, #4 (1985).

Primary Examiner—James H. Reamer

[57] ABSTRACT

A process for the production of 4,6-dimethyl-7-hydroxynonan-3-one of specific stereochemistry is disclosed. The process results in an active (+)-serricornin.

4 Claims, 7 Drawing Sheets



2026230374

United States Patent [19]

Roncero

[11] Patent Number: 4,843,801

[45] Date of Patent: Jul. 4, 1989

[54] METHODS AND APPARATUS FOR OPENING CLOSED CONTAINERS

[75] Inventor: Jose I. Roncero, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 198,497

[22] Filed: May 25, 1988

[51] Int. Cl.⁴ B65B 43/26

[52] U.S. Cl. 53/492; 53/381 R;
414/411

[58] Field of Search 53/381 R, 492; 414/411,
414/412, 414

[56] References Cited

U.S. PATENT DOCUMENTS

2,540,766	2/1951	Stilwell et al.	414/414
3,263,843	8/1966	Grahn et al.	414/412
3,386,320	6/1968	Pinkham et al.	414/412
3,889,442	6/1975	Grahn et al.	53/492
4,036,380	7/1977	Berry et al.	414/412
4,124,969	11/1978	Peyton	414/411

Primary Examiner—John Sipos

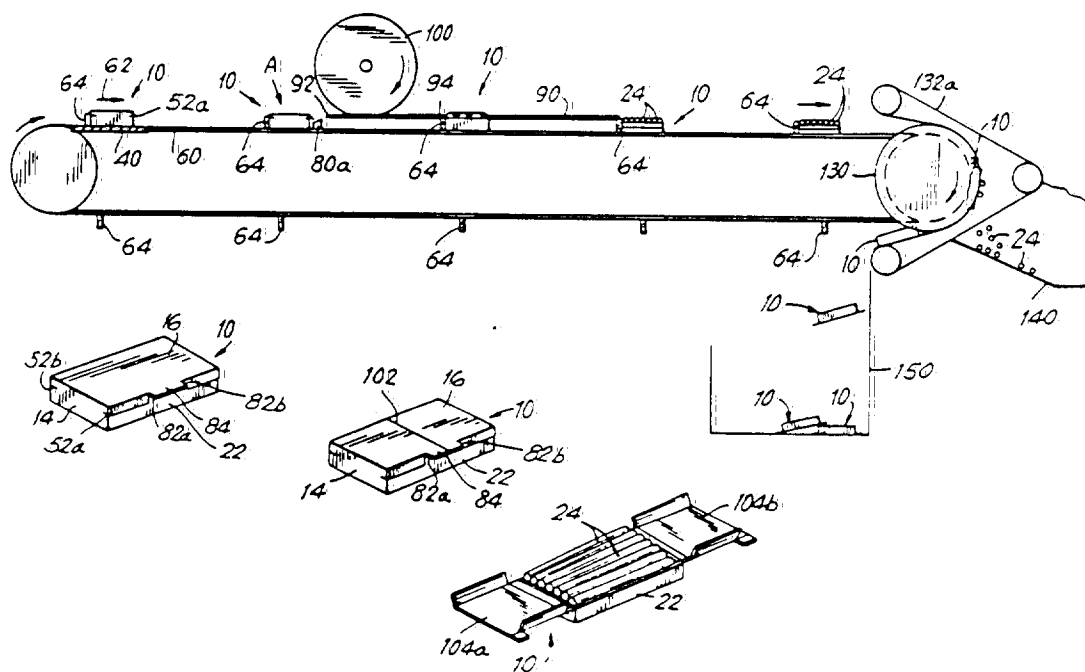
Assistant Examiner—Ann Tran

Attorney, Agent, or Firm—Robert R. Jackson

[57] ABSTRACT

Methods and apparatus for opening containers such as cigarette packages without damaging the contents of the containers. If desired, the methods and apparatus may be extended to include emptying the containers after they have been opened.

23 Claims, 10 Drawing Sheets



2026230375

III. PACKAGING TECHNOLOGY

2026230376

United States Patent [19]
Campbell

[11] **Patent Number:** 4,850,482
[45] **Date of Patent:** Jul. 25, 1989

- [54] **CIGARETTE BOX INNERFRAME**
[75] **Inventor:** Christopher J. Campbell, Midlothian, Va.
[73] **Assignee:** Philip Morris Incorporated, New York, N.Y.
[21] **Appl. No.:** 205,317
[22] **Filed:** Jun. 10, 1988
[51] **Int. Cl.⁴** B65D 85/10; B65D 5/48
[52] **U.S. Cl.** 206/273; 206/271; 206/268; 229/160.1
[58] **Field of Search** 206/268, 271, 273; 229/146, 160.1

3,752,308 8/1973 Begemann 206/273 X
4,081,126 3/1978 Barnard 229/160.1 X
4,241,827 12/1980 Focke 206/248
4,771,882 9/1988 Lowe et al. 206/268
4,793,478 12/1988 Tudor 206/256

FOREIGN PATENT DOCUMENTS

938974 10/1948 France
193808 1/1938 Switzerland
522469 6/1940 United Kingdom

OTHER PUBLICATIONS

"Packaging of Cigarettes", Disclosure 88/5, *Tobacco Patents Information Bulletin*, vol. 88, No. 35-36, Sep. 2, 1988.

Primary Examiner—John Rivell
Attorney, Agent, or Firm—Doreen F. Shulman

[56] **References Cited**

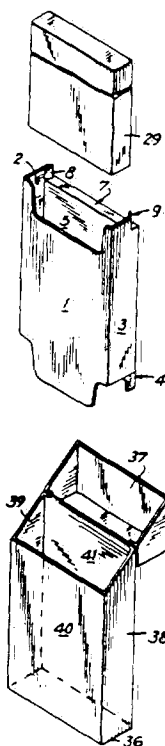
U.S. PATENT DOCUMENTS

949,176 12/1910 L'Enfant 425/311
1,253,219 1/1918 Dula 206/256
1,582,655 4/1926 Anderegg 220/441
1,806,905 5/1931 Kampfman 206/252
1,867,949 7/1932 Molins 206/273 X
2,803,391 8/1957 Koebler 229/27
2,820,545 1/1958 Bramhill 206/41
2,922,565 1/1960 Roderick et al. 229/44
2,944,555 7/1960 Peel et al. 131/238
3,058,581 10/1962 Keating 206/41
3,081,867 3/1963 Corey 206/41
3,489,272 1/1970 Rosen 206/48.5
3,536,246 10/1970 Rosen 229/16

[57] **ABSTRACT**

A paperboard innerframe for insertion into a cigarette box is provided. The innerframe allows a bundle of smaller than standard size cigarettes or a bundle of a small number of standard size cigarettes to be retained securely in a cigarette box that is larger than necessary to hold a bundle of such cigarettes exactly. The innerframe has a front panel, outer side panels, inner side panels, a back panel, a concealing flap and tapering tabs.

29 Claims, 3 Drawing Sheets



2026230377

[54] HINGED TOP CIGARETTE BOX

[75] Inventors: Donald H. Evers; Xuan M. Phan,
both of Richmond, Va.[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 387,835

[22] Filed: Aug. 1, 1989

[51] Int. Cl.⁵ A24F 15/00[52] U.S. Cl. 206/265; 206/270;
206/261; 206/204; 229/125.08; 229/125.17[58] Field of Search 206/261, 265, 268, 270,
206/271, 273, 204; 229/125.01, 125.08; 125.17

[56] References Cited

U.S. PATENT DOCUMENTS

- 1,278,691 9/1918 Leiman .
 1,532,831 4/1925 Mastin .
 2,085,600 6/1937 Petersen .
 2,272,203 2/1942 Hothersall .
 2,320,289 5/1943 Marx 206/268
 2,396,150 3/1946 Bonville .
 2,522,952 9/1950 Krohn 206/204
 2,661,139 12/1953 Brooks 229/125.08
 3,437,257 4/1969 Bua 229/125.17
 3,708,108 1/1973 Rosenberg, Jr. .
 3,858,788 1/1975 Philips, Jr. .
 3,929,271 12/1975 Meyers .
 4,183,457 1/1980 Loughiey et al. 229/125.17

- 4,267,926 5/1981 Toimil 206/268
 4,281,761 8/1981 Olazabal 206/268
 4,287,995 9/1981 Moriya .
 4,421,235 12/1983 Moriya .
 4,444,308 4/1984 MacEwen .
 4,834,234 5/1989 Sacherer et al. 206/204

FOREIGN PATENT DOCUMENTS

- 801564 7/1949 Fed. Rep. of Germany .
 206396 11/1923 United Kingdom .
 920354 3/1963 United Kingdom .
 1559807 1/1980 United Kingdom 206/273

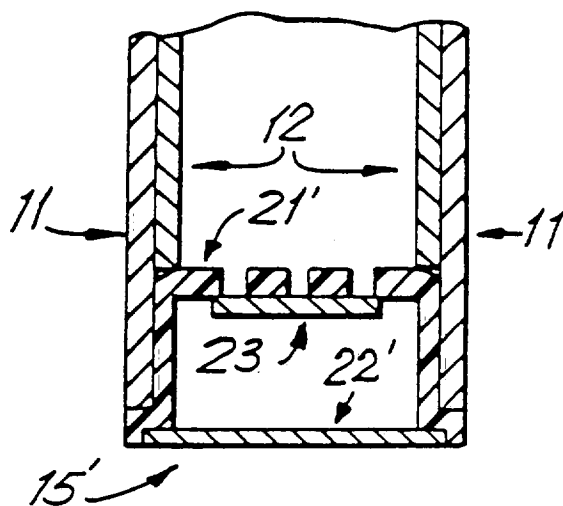
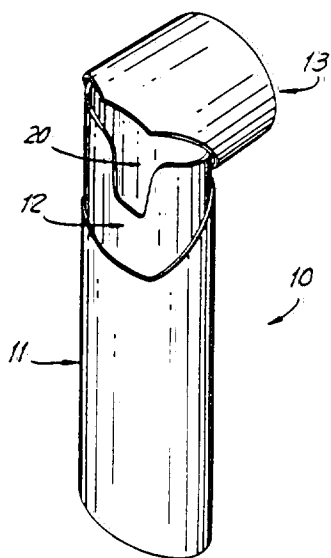
Primary Examiner—David T. Fidei

Attorney, Agent, or Firm—Eric M. Lee

[57] ABSTRACT

A hinged top cigarette box is provided. The box has an inner sleeve nested inside an outer sleeve. Preferably both the inner sleeve member and the outer sleeve member are formed from the same laminate blank. The outer sleeve member has a cover member formed therein. The cover member opens and closes by the use of a flexural hinge. Alternatively, the hinged top box can be formed by separate laminate blanks. Plugs may be used to close the top and bottom portion of the hinged top box to hold the shape of the hinged top box and to prevent cigarettes or loose tobacco from falling therethrough.

13 Claims, 6 Drawing Sheets



2026230378

United States Patent [19]
Marlow et al.

[11] **Patent Number:** Des. 303,722
[45] **Date of Patent:** ** Sep. 26, 1989

[54] **PACK FOR CIGARETTES**

[75] **Inventors:** Nicholas S. Marlow, London,
England; Witold Gruenbaum,
Chez-le-Bart, Switzerland

[73] **Assignee:** Fabriques de Tabac Reunies, S.A.,
Neuchatel, Switzerland

[**] **Term:** 14 Years

[21] **Appl. No.:** 915,038

[22] **Filed:** Oct. 3, 1986

[30] **Foreign Application Priority Data**

Apr. 4, 1986 [GB] United Kingdom 1033223
[52] **U.S. Cl.** D27/189
[58] **Field of Search** D27/100-101,
D27/187, 189; D9/423; 229/160.1; 206/268,
273

[56] **References Cited**

U.S. PATENT DOCUMENTS

D: 14,994 5/1884 Tannatt D9/423
D: 74,480 1/1926 Cowen D27/189
D: 139,199 12/1943 Treganowen D27/189

D. 147,254 8/1947 Streng D27/189
D. 219,226 11/1970 Biallo D9/423
3,874,581 4/1975 Fox et al. D27/189

FOREIGN PATENT DOCUMENTS

1559807 1/1980 United Kingdom 206/273
1029331 5/1986 United Kingdom .

OTHER PUBLICATIONS

United States registered trademark, Int. Cl. 34,
#938510, Philip Morris Incorporated, 7-1972.

Primary Examiner—Susan J. Lucas

Assistant Examiner—Joel Sincavage

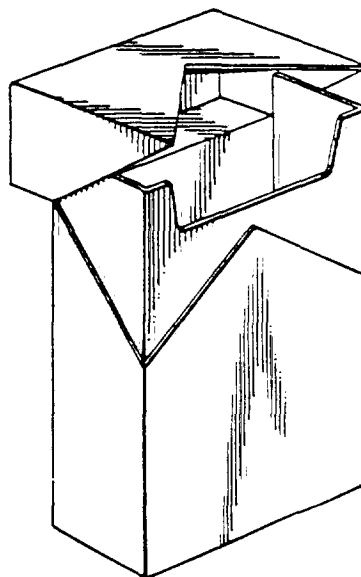
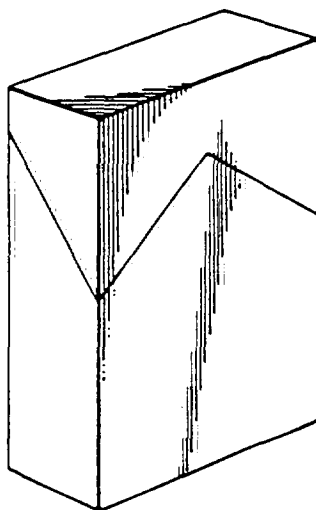
Attorney, Agent, or Firm—Jeffrey H. Ingeman

[57] **CLAIM**

The ornamental design for a pack for cigarettes, as
shown and described.

DESCRIPTION

FIG. 1 is a front perspective view of a pack for cigarettes in the closed position showing our new design;
FIG. 2 is a front perspective view thereof in the open position;
FIG. 3 is a rear elevational view thereof; and
FIG. 4 is a right side elevational view thereof.



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT. PATENT SECTION

DEC 11 1989

VOTED _____

2026230379

[54] APPARATUS AND METHOD FOR MEASURING TWO PROPERTIES OF AN OBJECT USING SCATTERED ELECTROMAGNETIC RADIATION

[75] Inventor: David A. Lowitz, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 342,872

[22] Filed: Apr. 25, 1989

[51] Int. Cl.⁵ G01R 27/04

[52] U.S. CL 324/631; 324/638; 324/632; 324/643; 324/634; 131/905

[58] Field of Search 131/905, 906, 908; 324/631, 638, 632, 643, 634

[56] References Cited

U.S. PATENT DOCUMENTS

3,103,627	9/1963	Schneider	324/631
4,350,170	9/1982	Baier	131/906
4,616,139	10/1986	Heitmann	131/905
4,707,652	11/1987	Lowitz	
4,727,311	2/1988	Walker	
4,766,910	8/1988	Okumoto	131/905
4,789,820	12/1988	Parrent, Jr. et al.	
4,805,641	2/1989	Radzio	131/905
4,836,221	6/1989	Okumoto	131/905

OTHER PUBLICATIONS

S. Nakayama, "Simultaneous Measurement of Basis Weight and Moisture Content of Sheet Materials by

Microwave Cavity", Japanese Journal of Applied Physics, vol. 26, No. 7, Jul. 1987, pp. 1198-99.

Primary Examiner—Reinhard J. Eisenzopf

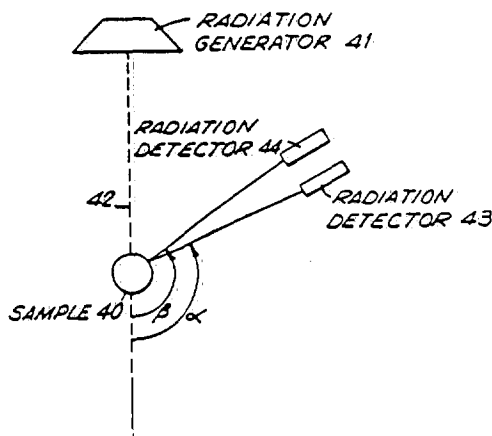
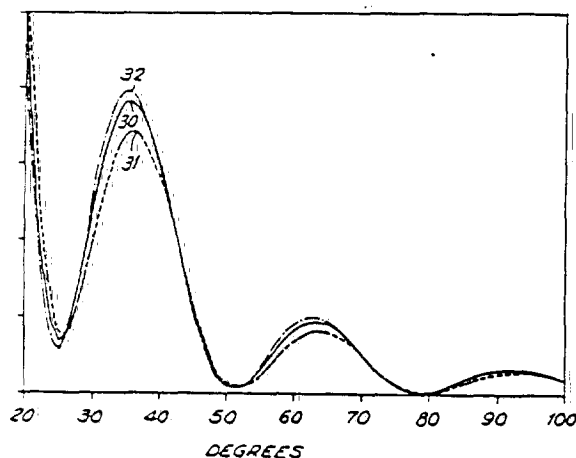
Assistant Examiner—Jose M. Solis

Attorney, Agent, or Firm—Jeffrey H. Ingberman

[57] ABSTRACT

A method and apparatus for monitoring two components of an object, such as moisture content and density in a tobacco rod, using scattered electromagnetic radiation are provided. The invention relies on the fact that both the real imaginary parts of the dielectric constant of water vary greatly over frequencies in the gigahertz region while those of the remaining constituents of tobacco do not, and particularly on the fact that, at frequencies approaching 100 GHz, the real part of the dielectric constant of water is much closer to that of many organic polymers, such as those making up tobacco, than it is at lower frequencies, and the imaginary part of the dielectric constant of water is much lower at frequencies approaching 100 GHz than it is in the region of 20 to 30 GHz. By comparing the scattering of electromagnetic radiation by the object—i.e., the cigarette rod—at two different frequencies and using a predetermined calibration curve based on a cigarette rod having a desired moisture content and density, one can determine the moisture content and density of the cigarette rod. If the monitoring is taking place on a cigarette making machine and the moisture content and density deviate from their desired values, the machine feeds can be adjusted automatically to restore the desired moisture content and density.

35 Claims, 6 Drawing Sheets



2026230380

IV. MAKE/PACK TECHNOLOGY

2026230381

[54] AIRLOCK HAVING FLAPS IN CONTINUOUS FEED OF MATERIAL CARRIED BY A GAS STREAM WHILE OBSTRUCTING FREE FLOW OF GAS

[75] Inventor: William R. Sweeney, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 135,145

[22] Filed: Dec. 18, 1987

[51] Int. Cl.⁴ B65G 53/08

[52] U.S. Cl. 406/62; 131/84.3; 131/109.1; 198/604; 198/607; 198/690.2; 414/217; 406/78

[58] Field of Search 406/62, 63, 64, 67, 406/72, 74, 80, 81, 82, 51, 52, 65, 68, 77, 79; 131/109.1, 84.3, 287; 414/217, 221; 198/607, 604, 626, 698, 690.2, 689.1, 428, 438, 494

[56] References Cited

U.S. PATENT DOCUMENTS

540,155	5/1895	Dula et al.	406/81 X
1,571,537	2/1926	Berold	131/315
1,675,090	6/1928	Burns et al.	131/315
2,003,141	5/1935	Dorfan	209/150
2,163,833	6/1939	Eissmann	131/312
2,173,087	9/1939	Eissmann	131/312
2,173,088	9/1939	Eissmann	131/312 X
2,643,768	6/1953	Eissmann	209/135
2,667,174	1/1954	Eissmann	131/312
2,701,570	2/1955	Eissmann	131/312
2,851,146	9/1958	Sherrill	198/438 X
2,988,213	6/1961	Davis et al.	209/21
3,043,315	7/1962	Verhappen	131/312
3,046,998	7/1962	Mortimer	131/312
3,091,244	5/1963	Molins et al.	131/84.3
3,116,238	12/1963	Van Etten	209/250
3,237,753	3/1966	Allen et al.	198/689.1 OR
3,360,125	12/1967	Horsey	209/12
3,362,414	1/1968	Wochowski	131/312
3,367,342	2/1968	Lewis	131/311
3,386,773	6/1968	Ballard, Jr.	406/16 X
3,409,025	11/1968	Wochowski	131/303 X
3,450,311	6/1969	Bonneric	198/524 X
3,460,869	8/1969	Herr	406/60
3,513,858	5/1970	Pietrucci	131/312
3,514,159	5/1970	Labbe	406/28

3,608,716	9/1971	Rowell et al.	209/139.1
3,655,043	4/1972	Wochowski	209/138
3,665,932	5/1972	Goidbach	131/280
3,826,065	7/1974	Labbe	131/110; X
3,881,590	5/1975	Hartmann	198/626
3,989,309	11/1976	Preston	406/70
3,991,772	11/1976	Smith, Jr.	131/138
4,009,912	3/1977	Mraz	406/144
4,024,878	5/1977	Labbe	131/84 B
4,135,615	1/1979	Brackmann et al.	198/371
4,166,027	8/1979	Smith	209/169
4,223,685	9/1980	Labbe	131/109
4,259,032	3/1981	Kuhner	406/62
4,264,238	4/1981	Leckband et al.	406/62
4,286,910	9/1981	Conrad	414/221
4,308,876	1/1982	Rothchild	131/293
4,408,619	10/1983	Perkins	131/108
4,446,876	5/1984	Brackman	131/110
4,474,511	10/1984	Labbe	406/70
4,475,562	10/1984	Thatcher et al.	131/110
4,507,876	4/1985	Conrad	34/242
4,557,278	12/1985	Brackmann et al.	131/109.1

FOREIGN PATENT DOCUMENTS

490237	1/1930	Fed. Rep. of Germany
548111	4/1932	Fed. Rep. of Germany
591577	4/1934	Fed. Rep. of Germany
US79/00705	9/1979	PCT Int'l Appl.
206350	11/1923	United Kingdom

Primary Examiner—Joseph F. Peters, Jr.

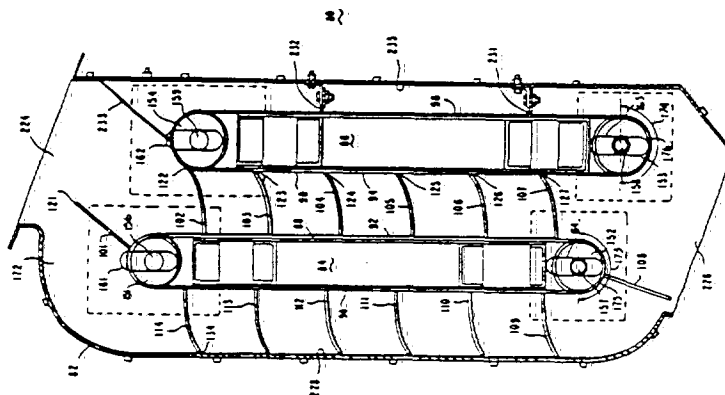
Assistant Examiner—Gregory R. Poindexter

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

An airlock for the continuously feeding through of a material while obstructing the free flow of a gas is provided. The airlock comprises a first continuous belt having a plurality of nonporous flaps projecting out from it. Each flap has a free edge located outwardly from the belt. A second belt runs parallel to the first and has elements to seal against the free edges of the flaps of the first belt. A motor moves the belts so that their transport sides move together. Particulates are transported in the chambers formed by belts and flaps while the flow of air between and past the belts is inhibited.

10 Claims, 6 Drawing Sheets



2026230382

[54] SEPARATION OF LIGHT PARTICLES FROM
HEAVY PARTICLES IN A STREAM OF
PARTICULATE MATTER

[75] Inventor: Jack C. Wheless, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 85,868

[22] Filed: Aug. 14, 1987

[51] Int. Cl.⁴ A24C 5/39

[52] U.S. Cl. 131/110; 131/84.3

[58] Field of Search 131/84.3, 110, 109.1,
131/169.2

[56] References Cited

U.S. PATENT DOCUMENTS

3,030,965	4/1962	Labbe .	
3,034,514	5/1962	Pinkham	131/84.3
3,092,117	6/1963	Labbe .	
4,288,318	9/1981	Essman et al. .	
4,526,182	7/1985	Labbe	131/110
4,553,555	11/1985	Cox	131/110

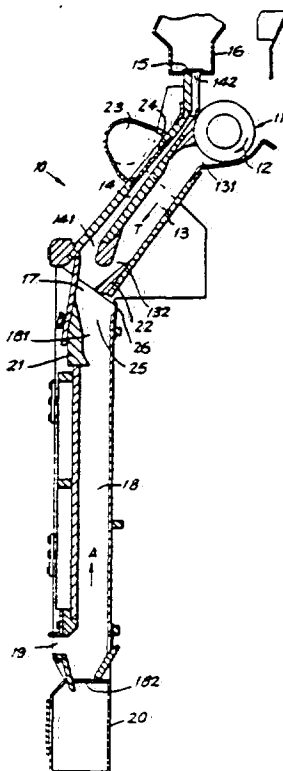
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

A method and apparatus for separating light particles from heavy particles in a stream of particulate matter, particularly for separating stems from the stream of tobacco filler fed to a cigarette maker, is provided. The tobacco is introduced into a first chamber in which it travels generally downward to a fourth chamber communicating with second and third chambers, the second chamber being the chimney of the cigarette maker and the third chamber extending downward from the fourth chamber. An air stream flowing upward through the third chamber reverses the momentum of most of the light particles and propels them into the chimney, while the heavy particles (stems) and some light particles travel downward into the third chamber. As the light particles fall through the third chamber, their momentum is gradually reversed by the air stream and they rise through the fourth chamber into the chimney. The heavy particles are collected at the bottom of the third chamber.

7 Claims, 1 Drawing Sheet



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

JAN - 2 1990

NOTED *Tob. material*

2026230383

[54] APPARATUS AND METHOD FOR IN-PLACE CLEANING AND PRIMING OF A NOZZLE ASSEMBLY

2030894 4/1980 United Kingdom
2163528 2/1986 United Kingdom

[75] Inventors: Bernard A. Semp; Bernard C. Kiernan; David L. Bilunas; Michael L. Watkins, all of Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 286,354

[22] Filed: Dec. 19, 1988

[51] Int. CL⁴ B08B 3/08; B08B 5/04

[52] U.S. CL 134/21; 134/22.18;
134/22.19; 134/22.12; 134/22.14; 134/57 R;
134/169 R

[58] Field of Search 134/21, 22.18, 22.19,
134/104.1, 198, 169 R, 22.12, 22.14

[56] References Cited

U.S. PATENT DOCUMENTS

3,146,950 9/1964 Lancaster 239/128
3,435,834 4/1969 Cooper 134/169 R
4,365,585 12/1982 Naylor et al. 118/302
4,420,635 12/1983 Washington et al. 562/555
4,500,770 2/1985 Vock et al. 219/121.7
4,562,099 12/1985 Hinchcliffe 427/282
4,763,672 8/1988 Gregory, III 131/79

FOREIGN PATENT DOCUMENTS

0072377 6/1978 Japan
1314276 4/1973 United Kingdom

OTHER PUBLICATIONS

"New Developments in CIP Practices", Chemical Engineering Progress, Jan. 1985, pp. 39-41.

Primary Examiner—Asok Pal

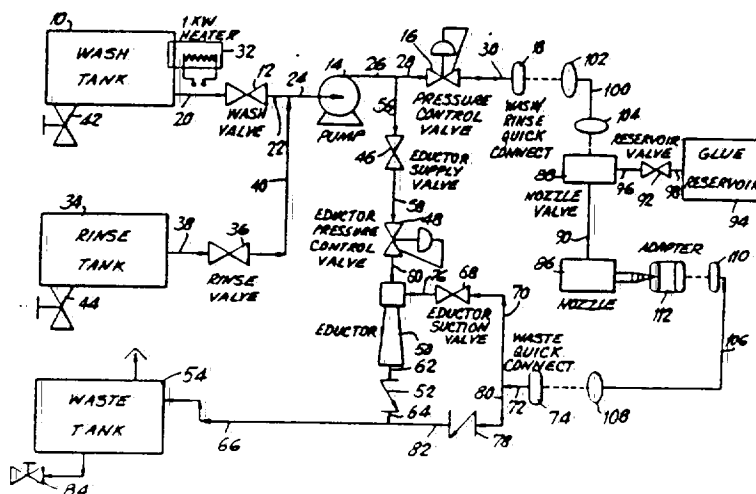
Assistant Examiner—Ourmazd Ojan

Attorney, Agent, or Firm—Charles B. Smith; Alan D. Smith

[57] ABSTRACT

An apparatus and method for in-place cleaning and priming of an in-place nozzle assembly which in normal operation receives from a reservoir and discharges to a work area a fluid material which tends to leave behind an accumulation of undesired residue. The apparatus includes control means for sequentially actuating for a selected cleaning time period first selectively actuatable means thereby to deliver an effective quantity of the cleaning substance to the nozzle and for actuating for a selected rinsing time period second selectively actuatable means thereby to deliver an effective quantity of the rinsing substance to the nozzle. The apparatus also includes third selectively actuatable means for drawing fluid material from the reservoir and delivering the same to the nozzle for a selected priming time period first to flush out any remaining rinsing substance from the nozzle and then to leave the nozzle primed with the fluid material.

2 Claims, 1 Drawing Sheet



[54] APPARATUS AND METHOD FOR
CARRYING OUT MEASUREMENTS ON A
BOBBIN OF SHEET MATERIAL

[75] Inventors: William H. Stevens, Richmond;
Everett C. Grollmund, Midlothian,
both of Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 308,731

[22] Filed: Feb. 9, 1989

[51] Int. Cl.⁴ G01N 15/08

[52] U.S. Cl. 73/866; 73/38

[58] Field of Search 73/866, 38, 865.8, 159,
73/866; 250/562, 572

[56] References Cited

U.S. PATENT DOCUMENTS

4,495,796 1/1985 Hester et al. 73/38

FOREIGN PATENT DOCUMENTS

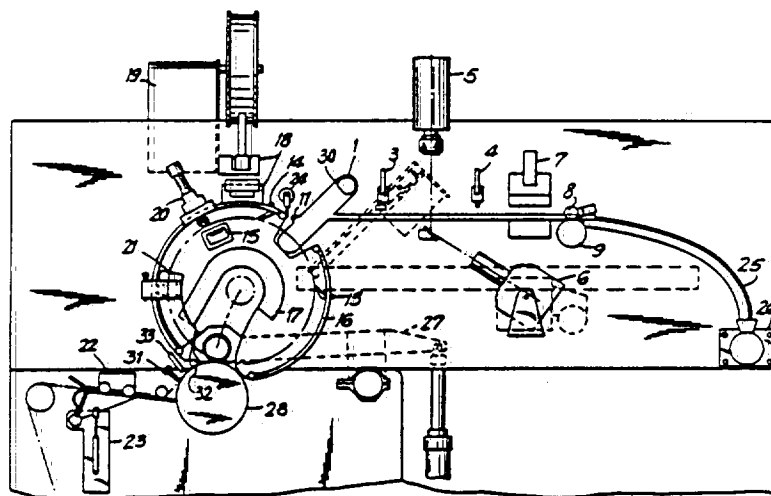
7177 1/1986 Japan 250/562

Primary Examiner—Jerry W. Myracle

[57] ABSTRACT

An apparatus and method for automatically stripping sheet material from a bobbin, measuring characteristics of the material and labelling the bobbin. The apparatus includes a delaminator pick-up device for securing a lamination layer of the material and picking-up the secured portion from the bobbin. A threading device threads the secured portion and contiguous portions of the material through a measurement device. The threaded material is engaged by an engaging device and passed through the measurement device. The measurement device measures characteristics of the material.

23 Claims, 6 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT-PATENT SECTION

AUG 20 1990

NOTED _____

2026230385

United States Patent [19]

Grollimund et al.

[11] Patent Number: 4,911,374

[45] Date of Patent: Mar. 27, 1990

[54] SYSTEM AND METHOD FOR USE IN
DELAMINATING BOBBINS OF PAPER
MATERIAL

[75] Inventors: Everett C. Grollimund, Midlothian;
Donald L. Brookman; Steven F.
Spiers, both of Richmond, all of Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 306,998

[22] Filed: Feb. 6, 1989

Related U.S. Application Data

[62] Division of Ser. No. 820,665, Jan. 21, 1986, Pat. No.
4,821,972.

[51] Int. Cl.⁴ B65H 35/00

[52] U.S. Cl. 242/56 R

[58] Field of Search 242/58, 56 R, 78.8,
242/58.4; 83/191, 154, 152, 338, 341

[56] References Cited

U.S. PATENT DOCUMENTS

4,688,736 8/1987 Brinker et al. 242/78.8 X

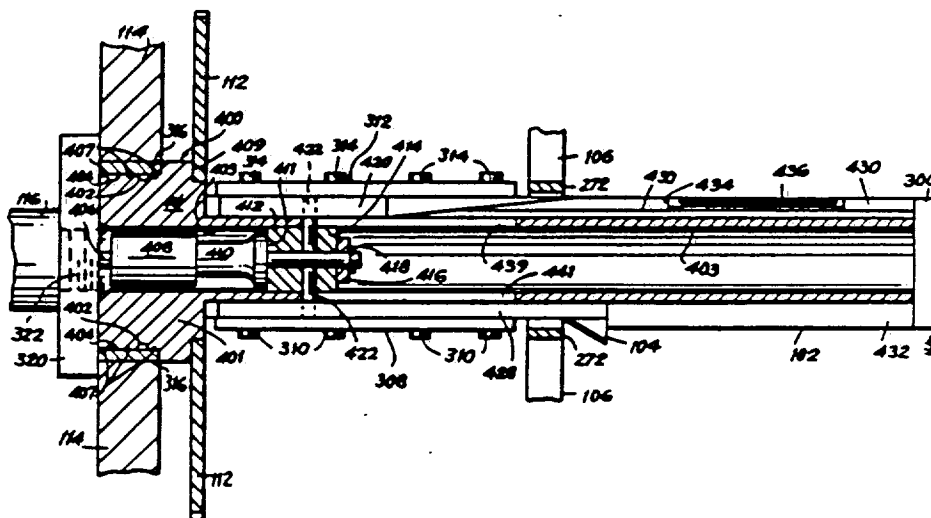
Primary Examiner—David Werner

Attorney, Agent, or Firm—Wayne M. Kennard

[57] ABSTRACT

A system and method for handling and delaminating a bobbin of sheet-like material, such as tipping paper, comprising a delaminator apparatus (100), a robotic arm assembly (182) having a robotic hand (185) connected thereto and a control console (212) for controlling the delaminator apparatus (100), the robotic arm assembly (182) and robotic hand (185) connected to the robotic arm assembly (182).

6 Claims, 11 Drawing Sheets



[54] TOBACCO FEEDING APPARATUS

[75] Inventors: Michael Lauenstein, Cormondrèche;
Bernard Tallier, Gorgier, both of
Switzerland

[73] Assignee: Fabriques de Tabac Reunies, S.A.,
Neuchatel, Switzerland

[21] Appl. No.: 268,989

[22] Filed: Nov. 9, 1988

[30] Foreign Application Priority Data

Nov. 16, 1987 [CH] Switzerland 4450/87

[51] Int. Cl.³ A24C 5/39

[52] U.S. Cl. 131/110; 131/108;
131/109.1; 131/109.2; 131/84.3

[58] Field of Search 131/110, 108, 109.1,
131/109.2, 84.1, 84.3

[56] References Cited

U.S. PATENT DOCUMENTS

3,544,167 12/1970 Fuchu et al. 131/110
3,580,644 5/1971 Ballard 131/110
4,832,058 5/1989 Labbe 131/110

FOREIGN PATENT DOCUMENTS

2139870 11/1984 United Kingdom

Primary Examiner—V. Millin

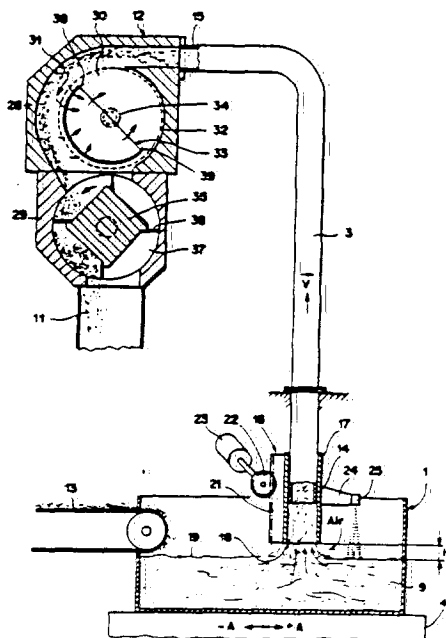
Assistant Examiner—Jennifer L. Doyle

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

In apparatus for feeding tobacco to cigarette-making machines, the tobacco (9) is conveyed by suction from a feed receptacle (1). One end (14) of a duct (3) facing the receptacle above the level (19) of the tobacco is provided with a device (16) for regulating the rate of tobacco delivery in order to allow continuous feeding of the cigarette-making machine. The regulating device comprises a movable sleeve (17) slidable on the end portion (14) of the duct so that the bottom rim (18) of the sleeve is always at a required distance H from the level of the tobacco, this distance being continuously detected by a sensor (25), and the quantity of tobacco drawn into the duct to be adapted to the rate of production being a function of H. The other end (15) of the duct opens out into a tangential separator (12). The regulating device combined with the tangential separator makes it possible to reduce damage to the particles of tobacco.

8 Claims, 3 Drawing Sheets



2026230387

- [54] A ROBOTIC HAND
[75] Inventors: Everett C. Grollimund, Midlothian;
Donald L. Brookman; Steven F.
Spiers, both of Richmond, all of Va.
[73] Assignee: Philip Morris, Inc., New York, N.Y.
[21] Appl. No.: 307,002
[22] Filed: Feb. 6, 1989

Related U.S. Application Data

- [62] Division of Ser. No. 820,665, Jan. 21, 1986, Pat. No.
4,821,972.
[51] Int. CL⁵ B65H 19/10; B66C 1/00;
B25J 11/00
[52] U.S. CL 242/72.1; 414/736;
414/911
[58] Field of Search 242/58.4, 78.8, 72 R,
242/72.1, 67.3 R; 901/6; 414/736, 744 A, 751,
776, 908, 911; 279/2 R, 2 A

[56] References Cited

U.S. PATENT DOCUMENTS

4,062,455 12/1977 Flatau 414/735

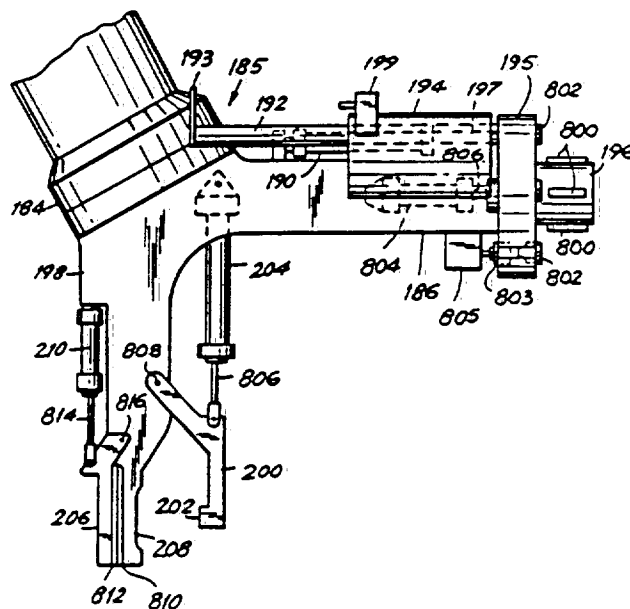
4,626,013 12/1986 Barrows 414/736 X
4,708,574 11/1987 Conboy et al. 414/626 X

Primary Examiner—David Werner
Attorney, Agent, or Firm—Wayne M. Kennard

[57] ABSTRACT

A robotic hand has two sections disposed 90 degrees apart. One section has a bobbin core-engaging device for the purpose of lifting and handling the bobbin. This section also has a bobbin transfer means for removing the bobbin from the bobbin core engaging device. The second section of the robotic hand has a first fixed finger and a second movable finger. The fingers are used for clamping at least one lamination thickness of paper from the bobbin therebetween and holding it while the robotic hand is indexed to thread a processing machine with the paper from the bobbin. The second section also has a bobbin core removing means formed by the first fixed finger and a movable third finger. The first and third fingers cooperate for engaging the bobbin core and removing it from the machine after all of the paper has been removed therefrom.

14 Claims, 11 Drawing Sheets



2026230388

V. OPTICAL PROCESSING/
QUALITY MEASUREMENTS

2026230389

United States Patent [19]

Banyasz et al.

[11] Patent Number: 4,890,053

[45] Date of Patent: Dec. 26, 1989

[54] METHOD AND APPARATUS FOR
DETECTING A MISSING OBJECT IN A SET
OF OBJECTS

[75] Inventors: Joseph L. Banyasz; Aubrey T. Burton;
Bernard C. LaRoy; David A. Lowitz,
all of Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 182,171

[22] Filed: Apr. 15, 1988

[51] Int. Cl.⁴ G01R 27/04

[52] U.S. Cl. 324/58.5 A; 324/58.5 R;
324/58 A; 340/673; 340/674

[58] Field of Search 340/673, 674; 324/58 R,
324/58 A, 58.5 A, 58.5 R

[56] References Cited

U.S. PATENT DOCUMENTS

3,339,195 8/1967 Murley 340/674
4,166,973 9/1979 Lilly 324/58.5 B
4,358,731 11/1982 Steinbrecher 324/58.5 R
4,381,485 4/1983 Steinbrecher 324/58 C
4,603,329 7/1986 Bangerter 340/674
4,620,146 10/1986 Ishikawa 324/58.5 A
4,716,360 12/1987 Pakulis 324/58.5 A

4,789,820 12/1988 Parrent 324/58.5 R

FOREIGN PATENT DOCUMENTS

3612749 10/1987 Fedi Rep. of Germany 324/58.5
A

OTHER PUBLICATIONS

P. F. Goldsmith, "Quasi-Optical Techniques at Milli-
meter and Submillimeter Wavelengths," *Infrared and
Millimeter Waves*, vol. 6, ch. 5, (K. J. Button, ed., 1982).
P. F. Goldsmith et al., "Gaussian Optics Lens Anten-
nas," *Microwave Journal*, Jul. 1984, (Millitech Corpora-
tion reprint, Sep. 1984).

Primary Examiner—Reinhard J. Eisenzopf

Assistant Examiner—Jose M. Solis

Attorney, Agent, or Firm—Jeffrey H. Ingberman

[57] ABSTRACT

A millimeter wave detector for detecting missing ciga-
rette packs or other types of objects in a set of objects is
provided. The detector uses millimeter wave radiation
at about 90 GHz to resolve small features of the objects
being scanned. The detector can detect defects or miss-
ing packs in configurations that would not be detected
by previously known detectors.

20 Claims, 9 Drawing Sheets

2026230390

[54] METHODS AND APPARATUS FOR OPTICAL PRODUCT INSPECTION

[75] Inventor: David P. Casasent, Pittsburgh, Pa.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 115,428

[22] Filed: Oct. 30, 1987

[51] Int. Cl.⁴ G01B 11/00

[52] U.S. Cl. 356/394; 382/8; 382/41

[58] Field of Search 356/394; 382/8, 25, 382/41, 46, 30; 350/433

[56] References Cited

U.S. PATENT DOCUMENTS

988,720	4/1911	Kohler	350/420
3,069,654	12/1962	Hough	340/146.3
4,242,702	12/1980	Kuni et al.	358/106
4,493,554	1/1985	Pryor et al.	356/394
4,515,480	5/1985	Miller et al.	356/394
4,618,989	10/1986	Tsukune et al.	382/25

FOREIGN PATENT DOCUMENTS

205628	12/1986	European Pat. Off.	
2704983	8/1978	Fed. Rep. of Germany	356/394
61-290583	12/1986	Japan	

OTHER PUBLICATIONS

Van Daele et al., "The Leuven Automatic Visual Inspection Machine", *Proceedings of the Society of Photo-Optical Instrumentation Engineers*, vol. 182 (1979) pp. 58-64.

Van Daele et al., "Automatic Visual Inspection of Reed Switches", *Optical Engineering*, vol. 19, No. 2, (Mar./Apr. 1980) pp. 240-244.

Wai-Hon Lee, "Computer-Generated Holograms;

Techniques and Applications", in *Progress in Optics*, vol. XVI, pp. 121-232, North-Holland Publishing Company, Amsterdam, 1978.

D. Casasent, "Coherent Optical Pattern Recognition", *Proceedings of the IEEE*, vol. 67, No. 5, May 1979, pp. 813-825.

G. R. Gindi et al., "Optical Feature Extraction Via the Radon Transform", *Optical Engineering*, vol. 23, No. 5, Sep./Oct. 1984, pp. 499-506.

D. Casasent, "Computer Generated Holograms in Pattern Recognition: A Review", *Optical Engineering*, vol. 24, No. 5, Sep./Oct. 1985, pp. 724-730.

W. H. Steier et al., "Optical Hough Transform", *Applied Optics*, vol. 25, No. 16, Aug. 1986, pp. 2734-2738.

C. Barney, "Hologram Filter Spots Images from Any Angle", *Electronics*, Sep. 4, 1986, pp. 37-38.

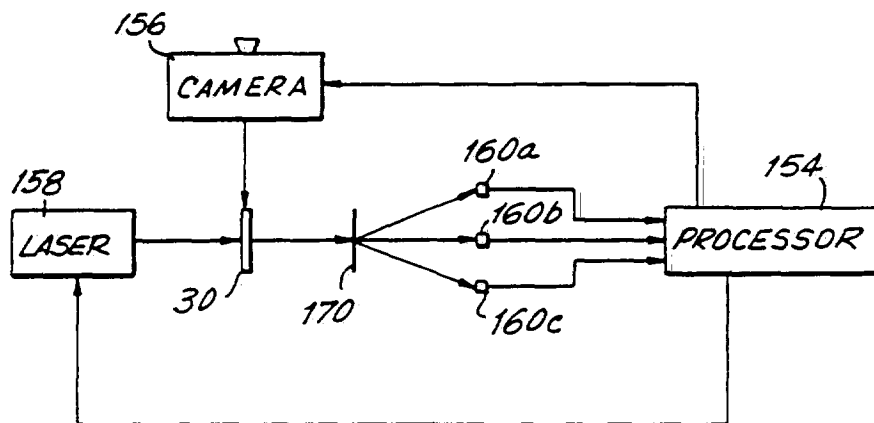
R. Krishnapuram, "Hough Space Transformations for Discrimination and Distortion Estimation", *Computer Vision, Graphics, and Image Processing*, vol. 38, No. 3, Jun. 1987, pp. 299-316.

Primary Examiner—Richard A. Rosenberger
Attorney, Agent, or Firm—Robert R. Jackson

[57] ABSTRACT

Products having optically detectable straight line segments are inspected for acceptability by forming one or more one-dimensional images of the product in which properly aligned straight line segments are respectively focused to points in the image. Such parameters as the location and image intensity of these one-dimensional image points are used to determine whether or not the product is acceptable. An optical Hough transform underlies these product inspection techniques.

34 Claims, 18 Drawing Sheets



2026230391

[54] METHODS AND APPARATUS FOR OPTICALLY ENHANCING SELECTED FEATURES IN AN INPUT IMAGE

[75] Inventor: Charles N. Harward, Midlothian, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 274,029

[22] Filed: Nov. 21, 1988

[51] Int. Cl.⁵ H04N 5/66

[52] U.S. Cl. 358/230; 350/334; 350/337

[58] Field of Search 350/340, 341, 334, 337; 358/230

[56] References Cited

U.S. PATENT DOCUMENTS

3,930,719	1/1976	Madrid et al.	350/336
4,459,615	7/1984	Mir	358/236
4,653,861	3/1987	Keindo et al.	350/337
4,743,097	5/1988	Johnson et al.	350/337

OTHER PUBLICATIONS

Hua-Kuang Liu et al., "On the Progress of the Liquid

Crystal Television Spatial Light Modulator," Jet Propulsion Laboratory, Calif. Inst. Tech., Pasadena, CA 91109.

Tien-Hsin Chao et al., "Real Time Optical Edge Enhancement Using a Hughes Liquid Crystal Light Valve", J.P.L., Calif Inst. Tech., Pasadena, CA 91109.

D. Armitage et al., "Photoaddressed Liquid-Crystal Spatial Light Modulators", Research & Development Div., Lockheed Missiles & Space Co., 3251 Hanover Street, Palo Alto, Calif., 94304.

K. D. Hughes et al., "Optical Preprocessing Using Liquid Crystal Televisions", *Applied Optics*, vol. 26, No. 6, Mar. 15, 1987, pp. 1042-1044.

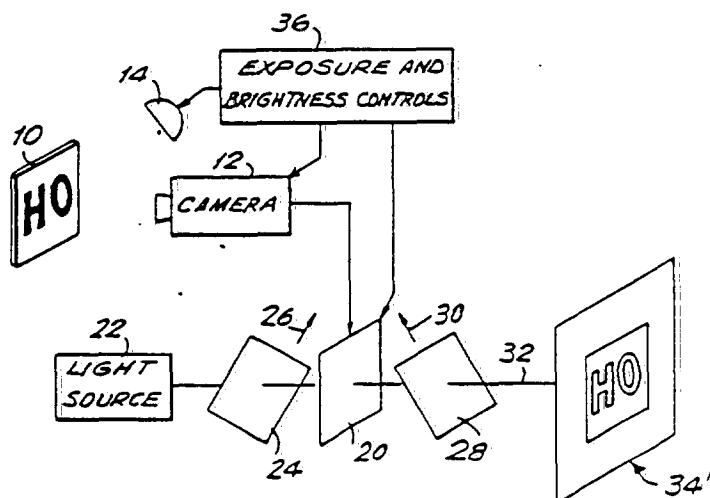
Primary Examiner—John K. Peng

Attorney, Agent, or Firm—Robert R. Jackson

[57] ABSTRACT

Input image features of predetermined brightness are enhanced in an output image by processing the input image using a liquid crystal display in conjunction with specially oriented light polarizing devices.

14 Claims, 4 Drawing Sheets



2026230392

[54] INSTRUMENT FOR MEASURING PACKAGE SEALS

[75] Inventors: J. Jerome Fleenor, Midlothian;
Christopher N. Chance, Richmond;
Robert T. Mitten, Glen Allen, all of
Va.

[73] Assignee: Philip Morris Incorporated, New
York, N.Y.

[21] Appl. No.: 331,598

[22] Filed: Mar. 30, 1989

[51] Int. Cl.⁵ G01M 3/32

[52] U.S. Cl. 73/49.3; 73/52

[58] Field of Search 73/49.3, 52, 45.4;
53/53

[56] References Cited

U.S. PATENT DOCUMENTS:

3,251,218 5/1966 Russell 73/52
4,012,945 3/1977 Bergstrand 73/49.2
4,118,972 10/1978 Goepner et al. 73/40
4,205,551 6/1980 Clifford et al. 73/52
4,517,827 5/1985 Tapscoff 73/45.4

4,539,836 9/1985 Hester et al. 73/49.3
4,593,554 6/1986 Aarts 73/49.3

FOREIGN PATENT DOCUMENTS

105033 6/1983 Japan 73/49.3
7810210 4/1980 Netherlands 73/52

Primary Examiner—Jerry W. Myracle

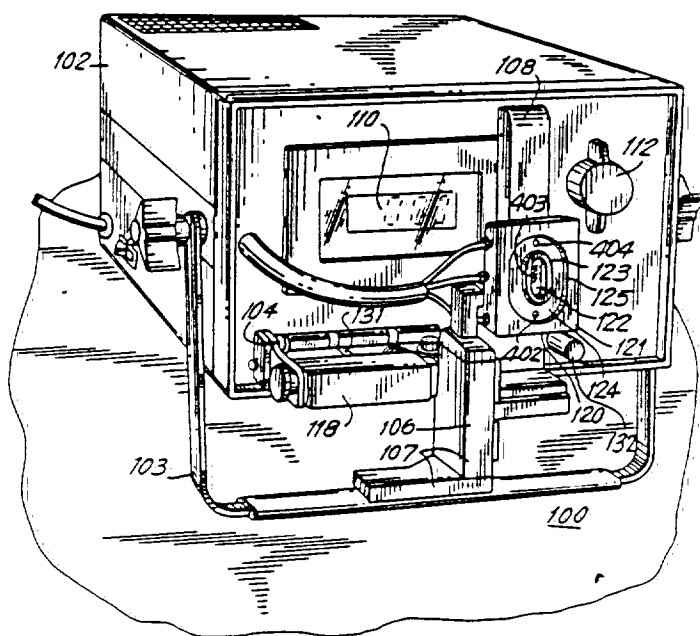
Assistant Examiner—Joseph W. Roskos

Attorney, Agent, or Firm—John R. Storella; Mark D.
Rowland

[57] ABSTRACT

An apparatus for testing the quality of a seal on a package overwrap having a cutting or burning element to create a hole in the package overwrap without breaching the integrity of the package; a measuring head for introducing super-atmospheric air pressure through the hole between the overwrap and the package; and a pressure transducer for determining whether the rate of air leakage from the overwrap is within acceptable limits.

20 Claims, 6 Drawing Sheets



2026230393

[54] APPARATUS AND METHOD FOR MEASURING TWO PROPERTIES OF AN OBJECT USING SCATTERED ELECTROMAGNETIC RADIATION

[75] Inventor: David A. Lowitz, Richmond, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 342,872

[22] Filed: Apr. 25, 1989

[51] Int. Cl.⁵ G01R 27/04

[52] U.S. Cl. 324/631; 324/638;
324/632; 324/643; 324/634; 131/905

[58] Field of Search 131/905, 906, 908;
324/631, 638, 632, 643, 634

[56] References Cited

U.S. PATENT DOCUMENTS

3,103,627	9/1963	Schneider	324/631
4,350,170	9/1982	Baier	131/906
4,616,139	10/1986	Heitmann	131/905
4,707,652	11/1987	Lowitz	
4,727,311	2/1988	Walker	
4,766,910	8/1988	Okumoto	131/905
4,789,820	12/1988	Parrent, Jr. et al.	
4,805,641	2/1989	Radzio	131/905
4,836,221	6/1989	Okumoto	131/905

OTHER PUBLICATIONS

S. Nakayama, "Simultaneous Measurement of Basis Weight and Moisture Content of Sheet Materials by

Microwave Cavity", Japanese Journal of Applied Physics, vol. 26, No. 7, Jul. 1987, pp. 1198-99.

Primary Examiner—Reinhard J. Eisenzopf

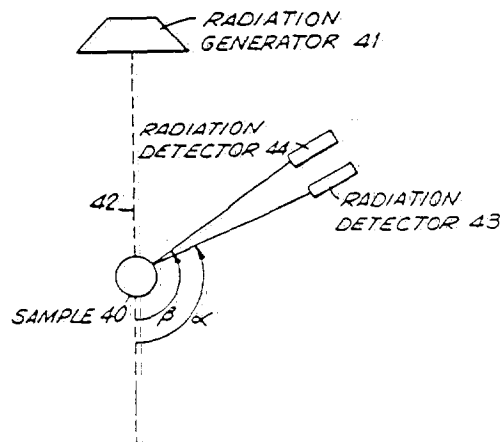
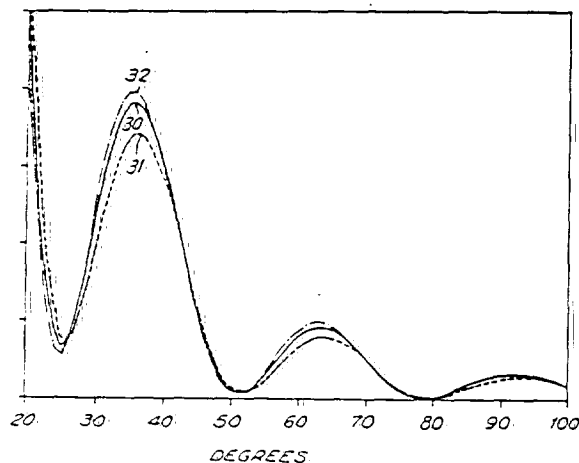
Assistant Examiner—Jose M. Solis

Attorney, Agent, or Firm—Jeffrey H. Ingerman

[57] ABSTRACT

A method and apparatus for monitoring two components of an object, such as moisture content and density in a tobacco rod, using scattered electromagnetic radiation are provided. The invention relies on the fact that both the real imaginary parts of the dielectric constant of water vary greatly over frequencies in the gigahertz region while those of the remaining constituents of tobacco do not, and particularly on the fact that, at frequencies approaching 100 GHz, the real part of the dielectric constant of water is much closer to that of many organic polymers, such as those making up tobacco, than it is at lower frequencies, and the imaginary part of the dielectric constant of water is much lower at frequencies approaching 100 GHz than it is in the region of 20 to 30 GHz. By comparing the scattering of electromagnetic radiation by the object—i.e., the cigarette rod—at two different frequencies and using a pre-determined calibration curve based on a cigarette rod having a desired moisture content and density, one can determine the moisture content and density of the cigarette rod. If the monitoring is taking place on a cigarette making machine and the moisture content and density deviate from their desired values, the machine feeds can be adjusted automatically to restore the desired moisture content and density.

35 Claims, 6 Drawing Sheets



2026230394

VI. NEW PRODUCTS/PROCESSES

2026230395

[54] METHOD AND APPARATUS FOR DRYING AND COOLING EXTRUDED TOBACCO-CONTAINING MATERIAL

[75] Inventors: Ronald A. Tamol; Jose G. Nepomuceno; Gus D. Keritsis; George H. Burnett, all of Richmond; Richard A. Thesing, Glen Allen; Warren D. Winterson, Midlothian; Walter A. Nichols, Richmond, all of Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 74,990

[22] Filed: Jul. 17, 1987

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 900,715, Aug. 27, 1986, which is a continuation-in-part of Ser. No. 740,325, Jun. 3, 1985, Pat. No. 4,632,131, which is a continuation-in-part of Ser. No. 627,407, Jul. 3, 1984, abandoned, which is a continuation-in-part of Ser. No. 723,883, Apr. 16, 1985, Pat. No. 4,625,737, which is a continuation of Ser. No. 457,505, Dec. 30, 1982, Pat. No. 4,510,950.

[51] Int. Cl.⁴ A24B 3/14
[52] U.S. Cl. 131/375; 131/294
[58] Field of Search 131/299, 294, 295, 375

[56] References Cited

U.S. PATENT DOCUMENTS

Re. 24,424 2/1955 Samfield .
T912,011 4/1973 Harpham et al. .
2,433,877 3/1948 Wells .
2,485,670 2/1949 Sowa et al. .
2,845,933 9/1958 Samfield .
3,012,562 6/1961 Merritt .
3,042,552 5/1962 Rosenberg et al. .

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

0113595 7/1984 European Pat. Off. .
0167370 1/1986 European Pat. Off. .
1167717 6/1964 Fed. Rep. of Germany .

2552504 7/1976 Fedl. Rep. of Germany 131/299
143799 1/1968 Netherlands .
690838 6/1969 South Africa .
0275420 9/1951 Switzerland .
282369 5/1926 United Kingdom .
909272 10/1962 United Kingdom .
1055445 1/1967 United Kingdom .
1397923 6/1975 United Kingdom 131/299
2064296 4/1980 United Kingdom .

OTHER PUBLICATIONS

"Microwaves Dry Pasta" Food Engineering Apr. 1979, pp. 95-96.

Schiffmann "The Applications of Microwave Power in the Food Industry in the United States" Journal of Microwave Power 8/2/73, one page.

"Drying" one page.

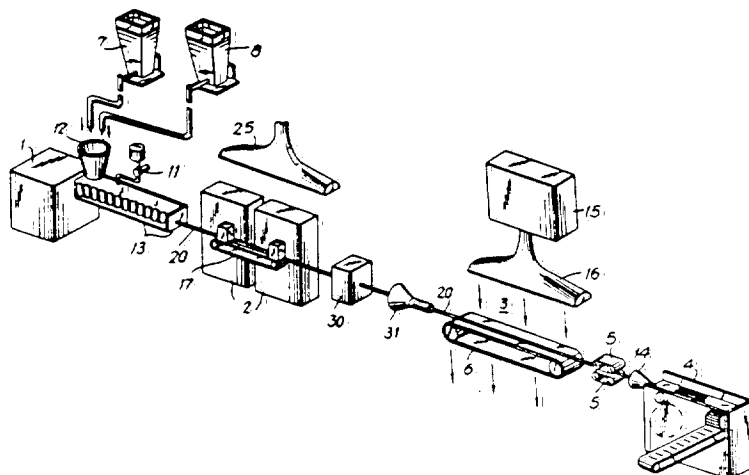
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Robert M. Isackson

[57] ABSTRACT

Apparatus and a method for processing hot, moist extruded tobacco-containing materials as they are continuously extruded by drying the extruded material rapidly with microwave energy, and then cooling the extruded material rapidly so that the surface temperature of the extruded material is decreased below the bulk temperature to provide the extruded material with an adequately rigid and stable dimensionally structure that can be formed into a smoking article. Microwave drying provides substantially uniform drying without case hardening the material. Cooling may occur by passing air at high velocity, refrigerated air or presenting a partial vacuum across the advancing extruded material, or contacting the material with cold contacting members or a cryogenic bath. Conventional maker devices can be used for forming smoking articles from the dried and cooled extruded material. The invention is useful particularly to process foamed, extruded materials into smoking articles which can be used with conventional cigarette maker equipment to produce large quantities of foamed, extruded tobacco-containing smoking articles having properties substantially equivalent to those of a conventional cigarette.

43 Claims, 1 Drawing Sheet



2026230396

United States Patent [19]

Keritsis et al.

[11] Patent Number: 4,936,920

[45] Date of Patent: Jun. 26, 1990

[54] HIGH VOID VOLUME/ENHANCED FIRMNESS TOBACCO ROD AND METHOD OF PROCESSING TOBACCO

[75] Inventors: Gus D. Keritsis, Richmond; Robert S. Mullins, Manakin-Sabot; Jose G. Nepomuceno; Lewis A. Haws, both of Richmond, all of Va.; Harry A. Jones, Boynton Beach, Fla.; Veronica Y. Manuel, Highland Springs; Wesley G. Sanderson, both of Richmond, Va.; John F. Sherwood; Warren D. Winterson, both of Midlothian, Va.

[73] Assignee: Philip Morris Incorporated, New York, N.Y.

[21] Appl. No.: 166,005

[22] Filed: Mar. 9, 1988

[51] Int. Cl.⁵ A24C 5/00; A24C 5/14

[52] U.S. Cl. 131/77; 131/78; 131/79; 131/84.1; 131/352; 131/364; 493/43; 493/49

[58] Field of Search 131/355, 359, 369, 364; 131/77, 78, 79, 84.1, 364, 352, 39, 42, 43, 44, 49

[56] References Cited

U.S. PATENT DOCUMENTS

61,275 0/1867 Stayman .
64,591 0/1867 Stayman .
236,510 0/1881 Pacholder .
1,961,866 6/1931 Rooker .
2,114,281 4/1938 Allen .
2,149,869 3/1939 McArdle .
2,185,293 1/1940 Copeman .
2,190,107 2/1940 Pohle .
2,217,527 10/1940 Roon .
2,307,088 1/1943 Whiteley .
2,349,551 5/1944 Helm .
2,592,554 4/1952 Frankeburg .
2,734,509 2/1956 Jurgensen .
2,739,600 3/1956 Staib .
2,769,734 11/1956 Bandel .
2,845,933 8/1958 Samfield .
3,012,915 12/1961 Howard .
3,046,996 7/1962 Gary .
3,053,259 9/1962 Parmele .

3,096,772 7/1963 Korber .
3,136,321 6/1964 Davis .
3,209,763 10/1965 Parmele .
3,318,317 5/1967 Sproull .
3,353,543 11/1967 Sproull .
3,364,935 1/1968 Moshy .
3,386,540 6/1968 Seligman .
3,402,722 9/1968 Kochalski .
3,404,690 10/1968 Moshy .
3,404,691 10/1968 Moshy .

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

0067601 12/1982 European Pat. Off. .
0232166 12/1987 European Pat. Off. .
1167717 4/1964 Fed. Rep. of Germany .
0275420 8/1951 Switzerland 131/77
1055445 1/1967 United Kingdom .
1157574 7/1969 United Kingdom .
1171878 11/1969 United Kingdom .
1194572 6/1970 United Kingdom .
1512352 6/1978 United Kingdom .
1593729 6/1981 United Kingdom .
2128873 5/1984 United Kingdom .

OTHER PUBLICATIONS

"Microwaves Dry Pasta", Food Engineering (Apr. 1972) Schiffman, "The Application of Microwave Power in the Food Industry in the United States", 8 J. Microwave Power 137 (Jun. 1973).

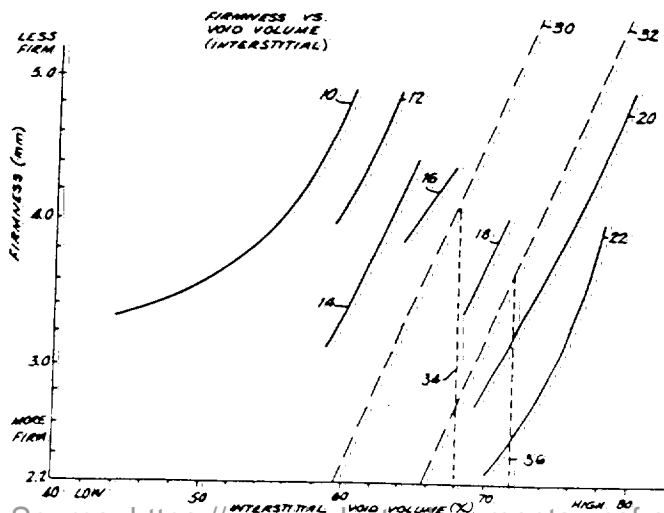
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Donald E. Degling; Mitchell P. Brook

[57] ABSTRACT

A tobacco product characterized by improved void volume and firmness characteristics and a method of making a tobacco product by applying binder material to tobacco filler, treating the filler to the extent necessary to cause the filler to become substantially non-tacky, forming a rod, activating the binder and treating the rod to the extent necessary to cause the filler shreds to become bonded to one another.

38 Claims, 5 Drawing Sheets



2026230397

VII. DEFENSIVE DISCLOSURES

2026230398

Item 23

TITLE : PINNED FEEDER CLEANING ARRANGEMENT
INVENTOR(S) : HINTON C M; ZIMMERMAN D R; SEMP B A
ASSIGNEE : PHILIP MORRIS
ABSTRACT : ARRANGEMENT OF BRUSHES AND SPRAYS DESIGNED TO CLEAN PIN
FEEDERS AND TO REDUCE THE BACTERIAL LOAD ENCOUNTERED BY
THE PRODUCT.
PM NUMBER/DATE : D416

Item 24

TITLE : BULK TOBACCO HANDLING SYSTEM COMPRISED OF A ENCLOSED
TRAILER WITH A BELT DRIVEN FLOOR AND A MODIFIED TOBACCO
SILO
INVENTOR(S) : MACHETT J M
ASSIGNEE : PHILIP MORRIS
ABSTRACT : THIS HANDLING SYSTEM WILL ELIMINATE THE USE OF CONTAINERS,
HOGSHEADS, OR CASES FOR THE DIRECT SHIPMENT OF TOBACCO
PRODUCTS BETWEEN LOCAL PROCESSING FACILITIES. IT IS COST
EFFECTIVE AND ASSURES MINIMAL PRODUCT DEGRADATION.
KEYWORDS : TRUCK; HANDLING; ENCLOSED; BELT; SILO
PM NUMBER/DATE : D421

Item 25

TITLE : IMPROVED PNEUMATIC SEPARATOR
INVENTOR(S) : ABEL M J; JONES D R; SIMS G M
ASSIGNEE : PHILIP MORRIS
ABSTRACT : IMPROVEMENTS TO A CARDWELL RPAL SEPARATOR. ELIMINATES
NEED FOR PRE-SCREENING OF LARGE TOBACCO PADS UPSTREAM OF

THE SEPARATOR; ELIMINATES DOWN TIME FROM CHOKE-UP OF THE
SEPARATOR ROTARY WINNOWER; REDUCES MAINTENANCE
REQUIREMENTS; ELIMINATES THE NEED FOR A VIBRATING CONVEYOR
TO FEED THE SEPARATOR WINNOWER; IMPROVES SEPARATION
EFFICIENCY.
KEYWORDS : SEPARATE
PM NUMBER/DATE : D419-1

2026230399

Published Papers July 1989 thru June 1990

HOUMINER Y\$ SOUTHWICK EW\$ WILLIAMS DL
SUBSTITUENT-DIRECTING EFFECTS IN THE HOMOLYTIC ACYLATION OF
PYRAZINE DERIVATIVES
JOURNAL OF ORGANIC CHEMISTRY# 54(3): 640-643; 1989.
1989

.....

(BREEN PJ)\$ (BERNSTEIN ER)\$ SECOR HV\$ SEEMAN JI
SPECTROSCOPIC OBSERVATION AND GEOMETRY ASSIGNMENT OF THE MINIMUM
ENERGY CONFORMATIONS OF METHOXY-SUBSTITUTED BENZENES
JOURNAL OF THE AMERICAN CHEMICAL SOCIETY# 111: 1958-1968; 1989.
1989

.....

JELTEMA MA\$ TINDALL JE\$ SOUTHWICK EW
APPLICATIONS OF SENSORY SCIENCE WITHIN THE TOBACCO INDUSTRY
JOURNAL OF SENSORY STUDIES# 3: 169-179; 1989.
1989

.....

SEEMAN JI\$ ENNIS DM\$ SECOR HV\$ (CLAWSON L)\$ (PALEN J)
THE PERCEPTUAL SIMILARITY OF SUBSTITUTED BENZENES AND PYRIDINES AS
A FUNCTION OF STERIC HINDRANCE
CHEMICAL SENSES# 14(3): 395-405; 1989.
1989

.....

(YAMAMOTO E)\$ BOKELMAN GH\$ (LEWIS NG)
PHENYLPROPANOID METABOLISM IN CELL WALLS: AN OVERVIEW
PLANT CELL WALL POLYMERS: BIOGENESIS AND BIODEGRADATION# EDITED BY
NORMAN G. LEWIS AND MICHAEL G. PAICE. WASHINGTON, DC: AMERICAN
CHEMICAL SOCIETY; 1989: 68-88.
1989

.....

(RUBEN GC)\$ BOKELMAN GH\$ (KRAKOW W)
TRIPLE-STRANDED LEFT-HAND HELICAL CELLULOSE MICROFIBRIL IN
ACETOBACTER XYLINUM AND IN TOBACCO PRIMARY CELL WALL
PLANT CELL WALL POLYMERS: BIOGENESIS AND BIODEGRADATION# EDITED BY
NORMAN G. LEWIS AND MICHAEL G. PAICE. WASHINGTON, DC: AMERICAN
CHEMICAL SOCIETY; 1989: 278-298.
1989

.....

(RUBEN GC)\$ BOKELMAN GH
STRUCTURAL CHARACTERIZATION AND VISUALIZATION IN SITU AND AFTER

ISOLATION OF TOBACCO PECTIN:
PLANT CELL WALL POLYMERS: BIOGENESIS AND BIODEGRADATION# EDITED BY
NORMAN G. LEWIS AND MICHAEL G. PAICE. WASHINGTON, DC: AMERICAN
CHEMICAL SOCIETY; 1989: 300-311.
1989

.....

(LEWIS NG)\$ (RAZAL RA)\$ (YAMAMOTO E)\$ BOKELMAN GH\$ WOOTEN JB
C-13 SPECIFIC LABELING OF LIGNIN IN INTACT PLANTS
PLANT CELL WALL POLYMERS: BIOGENESIS AND BIODEGRADATION# EDITED BY
NORMAN G. LEWIS AND MICHAEL G. PAICE. WASHINGTON, DC: AMERICAN
CHEMICAL SOCIETY; 1989: 169-181.
1989

.....

ENNIS DM
A RECEPTOR MODEL FOR BINARY MIXTURES APPLIED TO THE SWEETNESS OF
FRUCTOSE AND GLUCOSE: DE GRAAF AND FRIJTERS REVISITED
CHEMICAL SENSES# 14(4): 597-604; 1989.
1989

.....

(BREEN PJ)\$ (BERNSTEIN ER)\$ SEEMAN JI\$ SECOR HV
DETERMINATION OF THE MINIMUM-ENERGY CONFORMATION OF ALLYL BENZENE
AND ITS CLUSTERS WITH METHANE, ETHANE, WATER AND AMMONIA
JOURNAL OF PHYSICAL CHEMISTRY# 93(18): 6731-6736; 1989.
1989

.....

KUHN WF\$ LEISTER DS\$ KAO JS\$ LILLY AC
COMPARISON OF THEORETICAL AND EXPERIMENTAL IONIZATION POTENTIALS OF
NICOTINE AND RELATED MOLECULES
JOURNAL OF MOLECULAR STRUCTURE# 212: 37-44; 1989.
1989

.....

SEEMAN JI\$ SECOR HV\$ (BREEN PJ)\$ (GRASSIAN VH)\$ (BERNSTEIN ER)
A STUDY OF NONRIGID AROMATIC MOLECULES. OBSERVATION AND
SPECTROSCOPIC ANALYSIS OF THE STABLE CONFORMATIONS OF VARIOUS
ALKYL BENZENES BY SUPERSONIC MOLECULAR JET LASER SPECTROSCOPY
JOURNAL OF THE AMERICAN CHEMICAL SOCIETY# 111(9): 3140-3150; 1989.
1989

.....

(GRASSIAN VH)\$ (BERNSTEIN ER)\$ SECOR HV\$ SEEMAN JI
CONFORMATIONAL STUDY OF JET-COOLED STYRENE DERIVATIVES.
DEMONSTRATION OF THE PLANARITY OF NONSTERICALLY HINDERED STYRENES
JOURNAL OF PHYSICAL CHEMISTRY# 93(9): 3470-3474; 1989.
1989

.....

PODRAZA KF\$ BASSFIELD RL
REGIOSPECIFIC ALKYLATION OF 3-SUBSTITUTED-2-CYCLOHEXEN-1-ONES.
SYNTHESIS AND CONFORMATIONAL ANALYSIS OF
6-(CARBETHOXYMETHYL)-3-SUBSTITUTED-2-CYCLOHEXEN-1-ONES.
JOURNAL OF ORGANIC CHEMISTRY# 54(25): 5919-5922; 1989.
1989

.....

ENNIS DM\$ (MULLEN K)\$ (FRIJTERS J)\$ TINDALL JE
DECISION CONFLICTS: WITHIN-TRIAL RESAMPLING IN RICHARDSON'S METHOD
OF TRIADS.
BRITISH JOURNAL OF MATHEMATICAL AND STATISTICAL PSYCHOLOGY# 42:
265-269; 1989.
1989

.....

DEBARDELEBEN MZ\$ LUNSFORD CG\$ TABB JR\$ DAVIS GD\$ SINKIEWICZ PB\$
(DENNY DM)\$ CLARKE HL\$ ROSENBERG MD
INDEXED GUIDE TO THE TOBACCO CHEMISTS' RESEARCH CONFERENCES 1947
THROUGH 1988. COMPILED AND DESIGNED BY M. Z. DEBARDELEBEN, C. G.
LUNSFORD, J. R. TABB, G. D. DAVIS, P. B. SINKIEWICZ, D. M. DENNY,
H. L. CLARKE AND M. D. ROSENBERG. NEW YORK: PHILIP MORRIS INC.;
1989.
1989

.....

(LILLEHOJ EP)\$ MALIK VS
PROTEIN PURIFICATION
ADVANCES IN BIOCHEMICAL ENGINEERING/BIOTECHNOLOGY# 40: 19-71; 1989.
1989

.....

(YAGEN B)\$ (HUTCHINS JE)\$ COX RH\$ (HAGLER WM)\$ (HAMILTON PB)
AFLATOXIN B1S: REVISED STRUCTURE FOR THE SODIUM SULFONATE FORMED BY
DESTRUCTION OF AFLATOXIN B1 WITH SODIUM BISULFITE^{1,2}
JOURNAL OF FOOD PROTECTION# 52: 574-577; 1989.
1989

.....

BASS RT\$ BROWN LE\$ HASSAM SB\$ NEWELL GC\$ NEWMAN RH
CIGARETTE SMOKE FORMATION STUDIES. TRANSFER OF ADDED [18-CARBON14]
OCTATRIACONTANE.
BEITRAGE ZUR TABAKFORSCHUNG INTERNATIONAL# 14(5): 289-296; 1989
OCTOBER.
1989

.....

SEEMAN JI\$ SECOR HV\$ (ARMSTRONG DW)\$ (WARD KD)\$ (WARD TJ)
SEPARATION OF HOMOLOGOUS AND ISOMERIC ALKALOIDS RELATED TO NICOTINE
ON A BETA-CYCLODEXTRIN-BONDED PHASE
JOURNAL OF CHROMATOGRAPHY# 483: 169-177; 1989.
1989

.....

MALIK VS
BIOTECHNOLOGY - THE GOLDEN AGE
ADVANCES IN APPLIED MICROBIOLOGY# 34: 263-305; 1989.
1989

.....

(ARMSTRONG DW)\$ (BERTRAND GL)\$ (WARD KD)\$ (WARD TJ)\$ SECOR HV\$
SEEMAN JI
EVALUATION OF THE EFFECT OF ORGANIC MODIFIER AND PH ON RETENTION
AND SELECTIVITY IN REVERSED-PHASE LIQUID CHROMATOGRAPHIC SEPARATION
OF ALKALOIDS ON A CYCLODEXTRIN BONDED PHASE
ANALYTICAL CHEMISTRY# 62(4): 332-338; 1990.
1990

.....

SEEMAN JI
EXTRACTING THE ESSENCE. ADVENTURES OF THE EDITOR WHO GUIDED A
BIOGRAPHICAL TOUR DE FORCE
CHEMTECH# 20(2): 86-90; 1990.
1990

.....

GANERIWALA SN\$ HARTUNG HA
FOURIER TRANSFORM MECHANICAL ANALYSIS AND PHENOMENOLOGICAL
REPRESENTATION OF VISCOELASTIC MATERIAL BEHAVIOR
SOUND AND VIBRATION DAMPING WITH POLYMERS# EDITED BY ROBERT D.
CORSARO AND L. H. SPERLING. WASHINGTON, DC: AMERICAN CHEMICAL
SOCIETY; 1990: 92-110.
1990

.....

GANERIWALA SN
RELATIONSHIP BETWEEN MORPHOLOGY AND MECHANICAL PROPERTIES OF
TOBACCO LEAF LAMINA
JOURNAL OF MATERIALS SCIENCE# 25: 2199-2206; 1990.
1990

2026230403

Appendix G

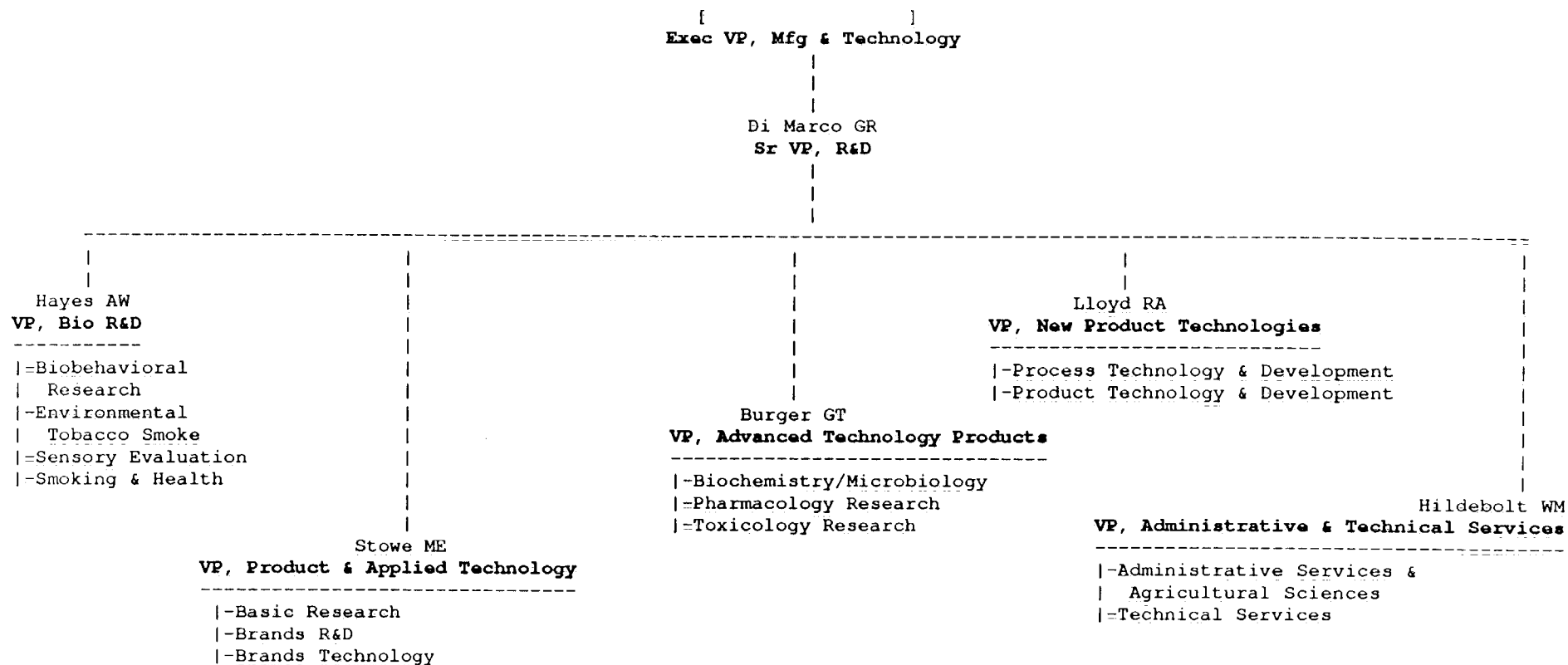
2026230404

APPENDIX G

RJR R&D Organization Chart

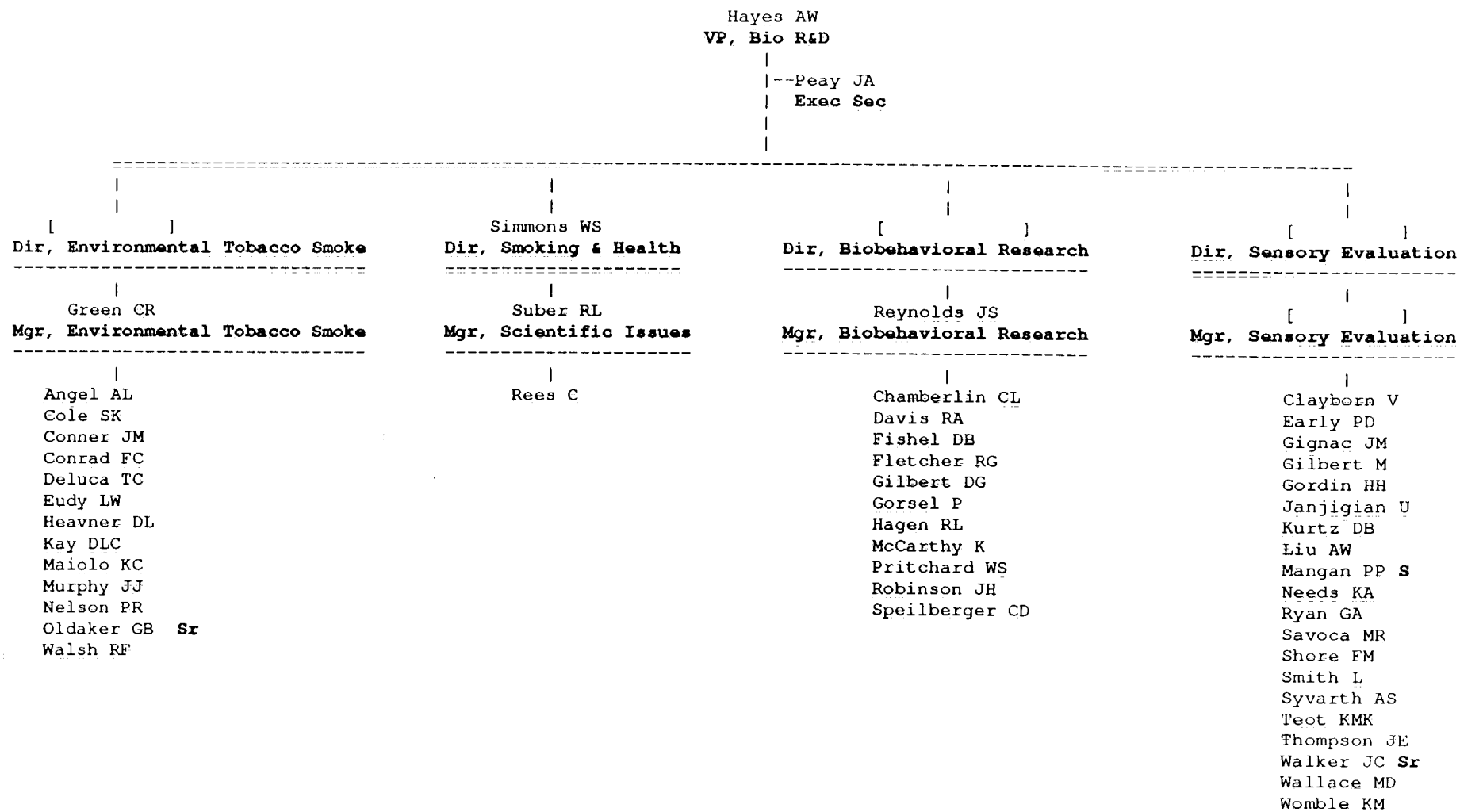
2026230405

rjr-chart.1
9/17/90



2026230406

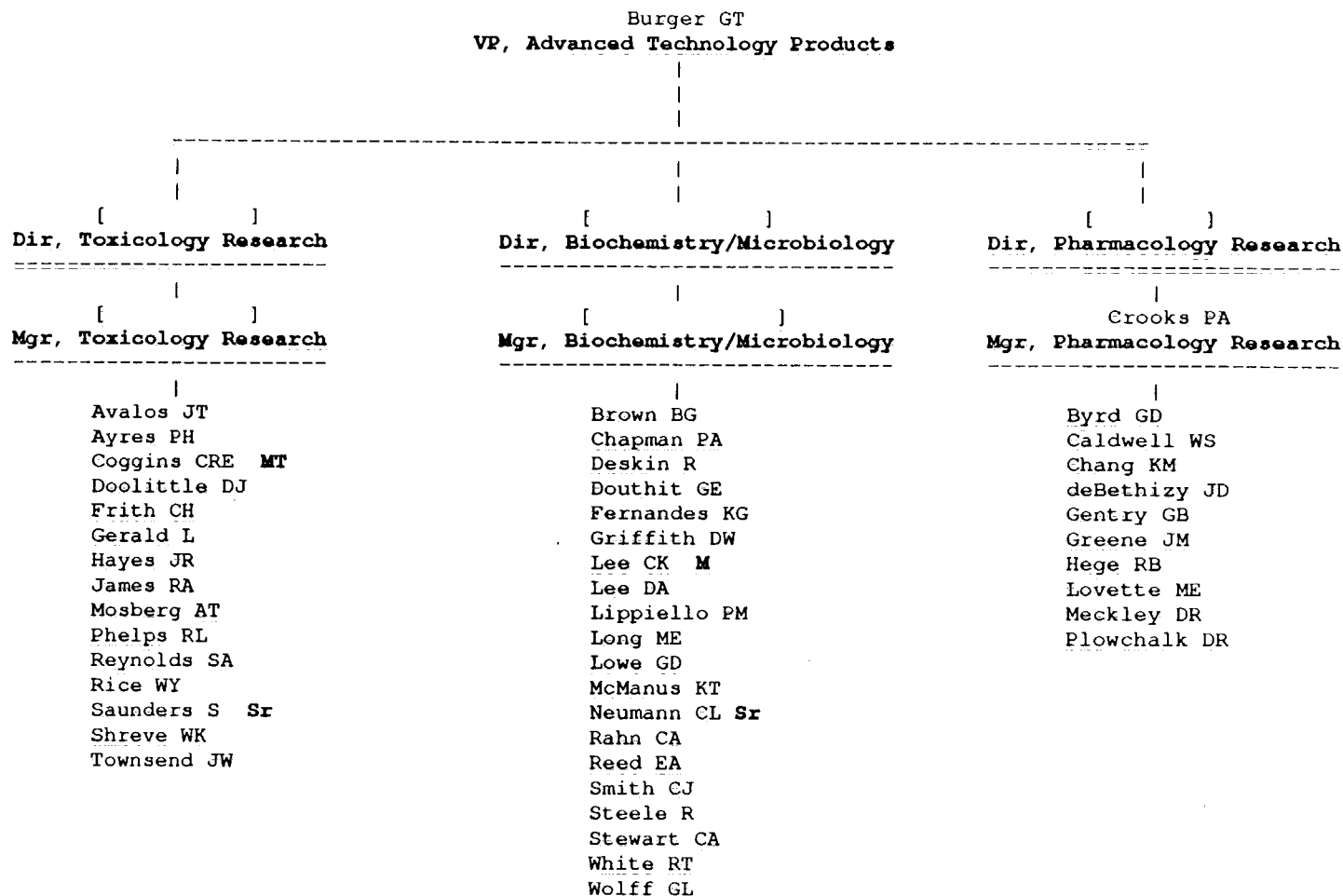
rjr-chart.2
10/23/90



S = Scientist
Sr = Senior Scientist

2026230407

rjr-chart.3
10/23/90

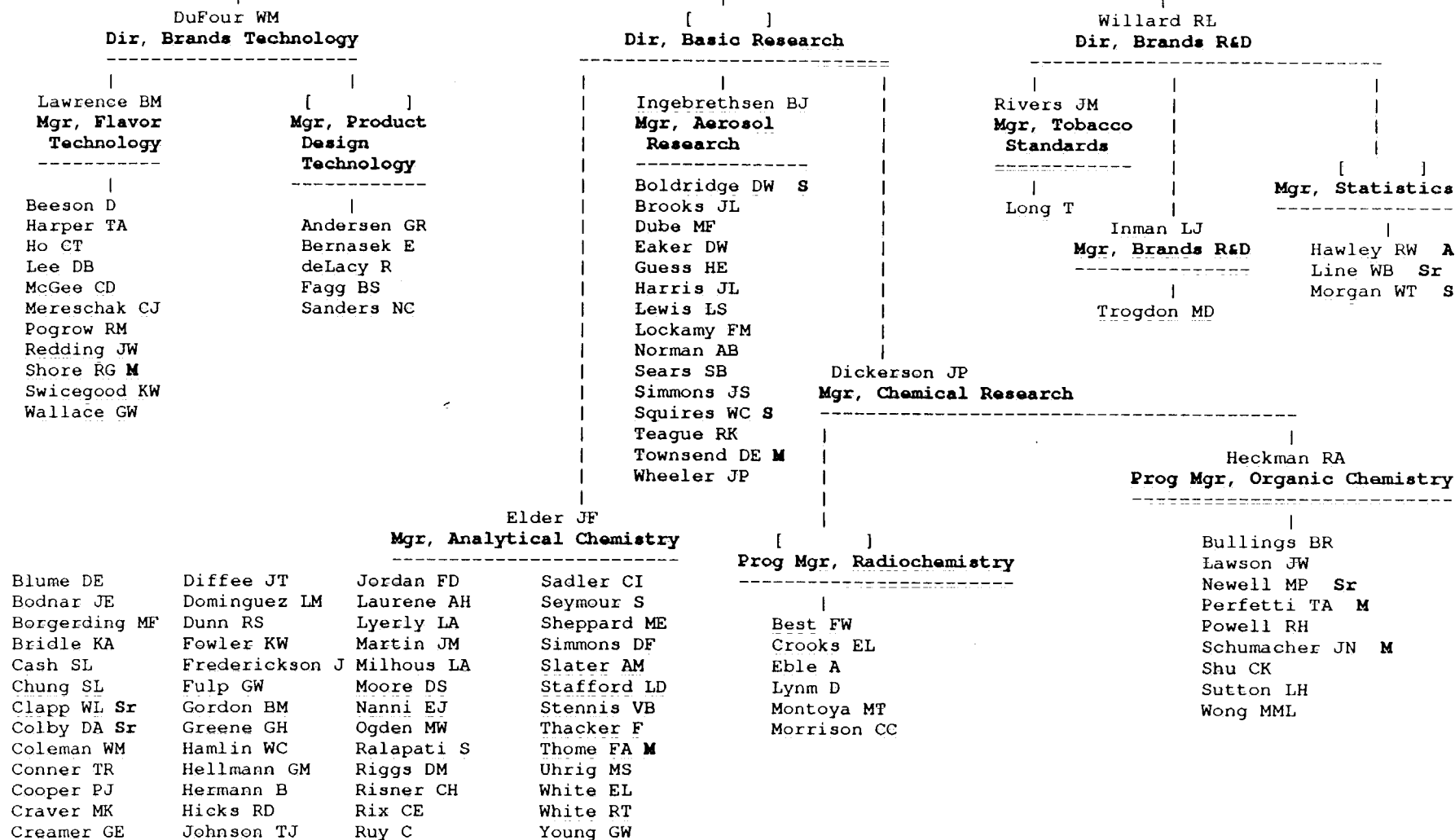


M = Master Scientist
MT = Master Toxicologist
Sr = Senior Scientist

2026230408

rjr-chart.4
10/23/90

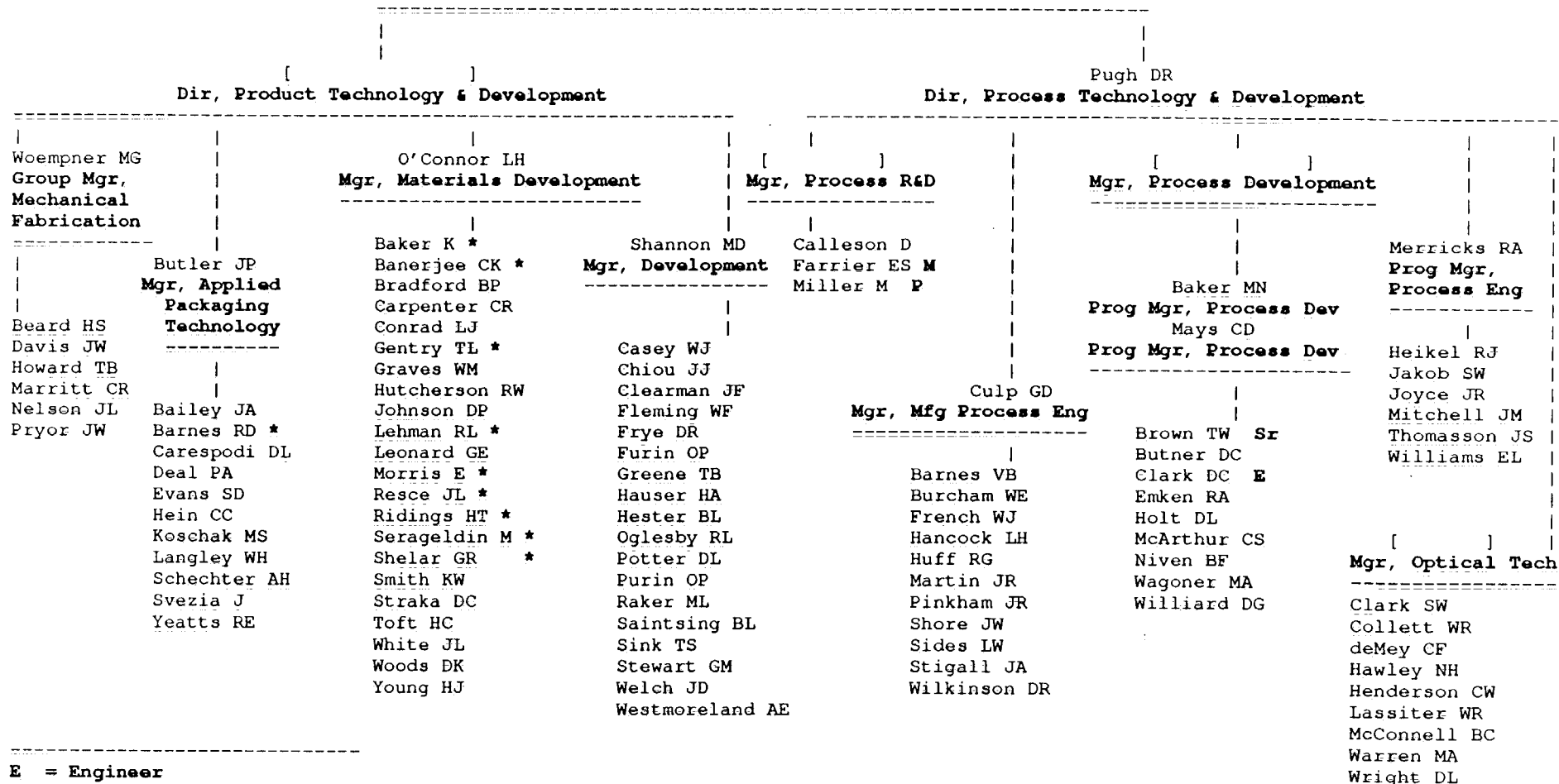
Stowe ME
VP, Product & Applied Technology
---Sensabaugh AJ
Principal Scientist



M = Master Scientist
S = Scientist
Sr = Senior Scientist

6070829202

Lloyd RA
VP, New Product Technologies

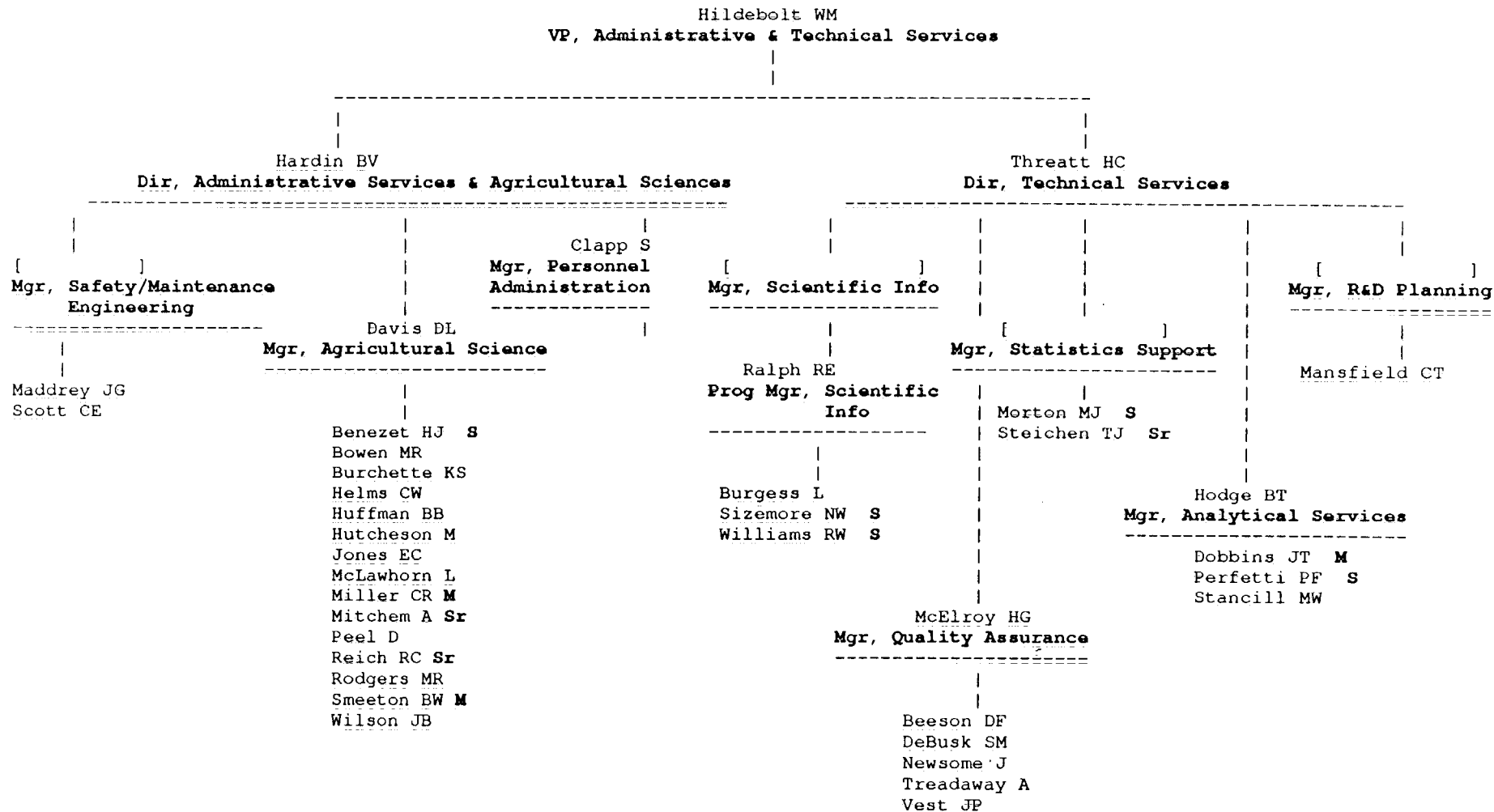


E = Engineer
M = Master Engineer
P = Principal Engineer
Sr = Senior Engineer

* These are people previously designated to the "Smokeless Cigarette" division.

NOTE: Both Baker and Mays were promoted to the same position title in the same year.

2026230410



M = Master Scientist
S = Scientist/Statistician
Sr = Senior Scientist/Statistician/Coordinator

2026230411

2026230412

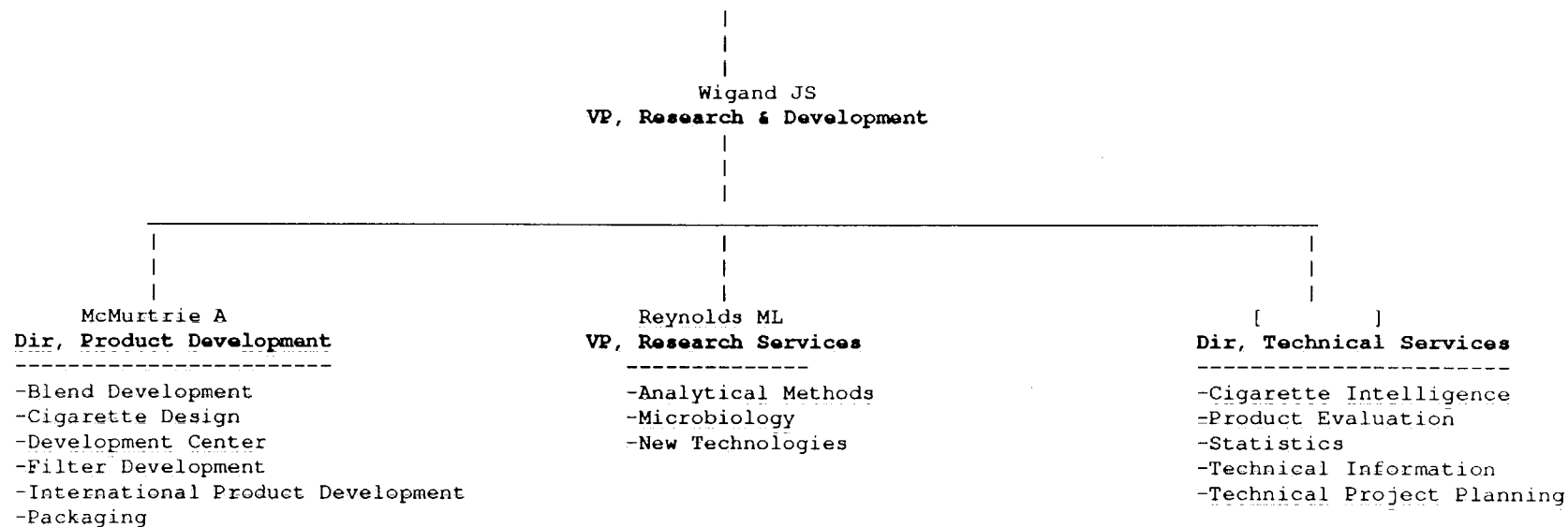
Appendix H

APPENDIX H

B&W R&D Organization Chart

2026230413

bw=chart.1
10/23/90



2026230414

bw-chart.2
7/3/90

McMurtrie A
Dir, Product Development

===Johnson RR P

Wilson R
Mgr, Blend Development

Bandy B
Mgr, Development Ctre*

[]
Mgr, International Product Dev

Adams SM A
Allen TL
Sachleben LR
Snyder DD

St. Charles FK
Mgr, Filter Development

Heaney R
Jones RL
Lowe BL
Maccaferri MA
Manecke KA
McDaniel WM
Naslund EI
Reed SP
Silberstein DA
Sullivan JW
Tribbey P
Vester RP

[]
Mgr, Cigarette Design

Cantrell DV
Gonterman RA
Riley KA
Roth DA
Scholten DL
Zielke MW C

Frank DM

Flaherty KA
Mgr, Packaging

Emery CN
Huber DJ
Kunkel L
Lewis T
Radley CP
Tudor TT

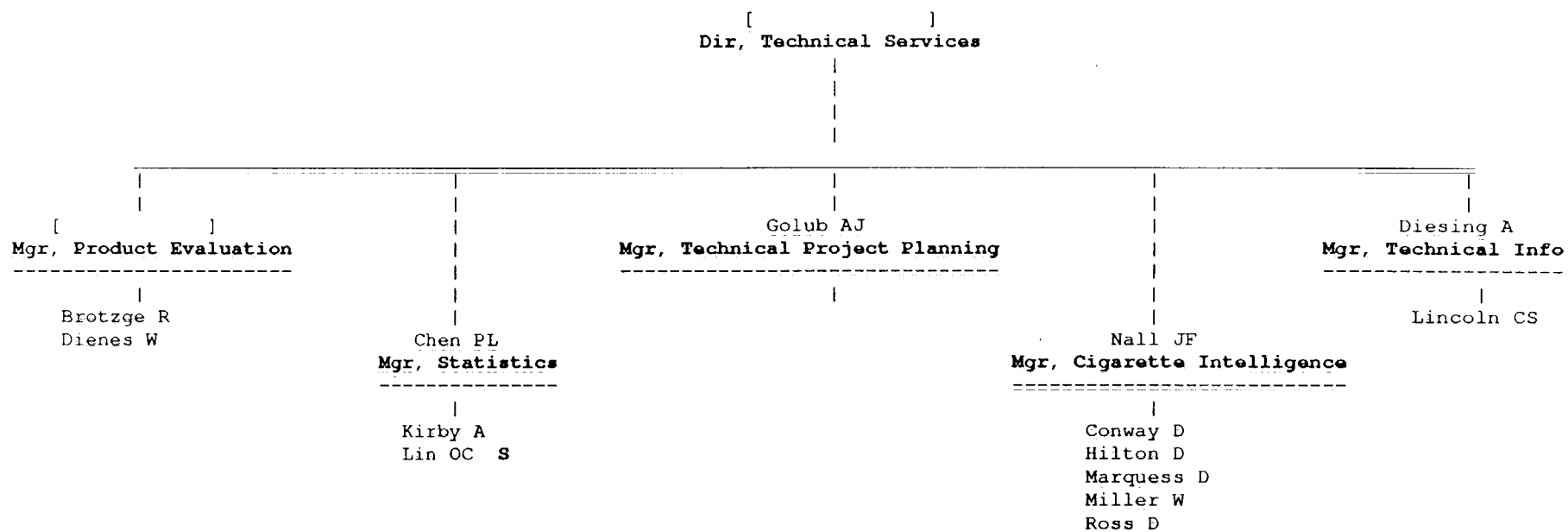
=====
* Pilot Plant

A=Associate Leaf Blender
C=Development Chemist

2026230415

bw-chart.3

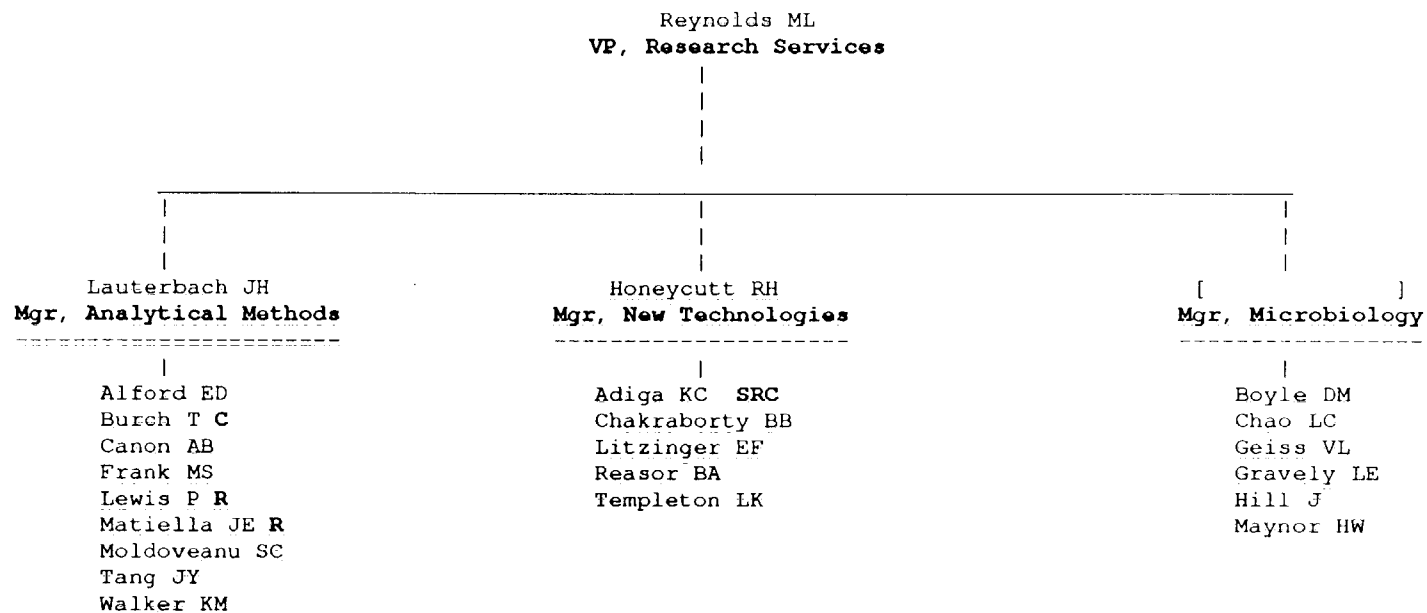
7/3/90



S=Statistician

2026230416

bw-chart.4
10/23/90



C =Chemist
R =Research Chemist
SRC=Senior Research Chemist

2026230417

Appendix I

2026230418

APPENDIX I

JTI Annual Report and Brochures

2026230419



JAPAN TOBACCO INC. ANNUAL REPORT 1989 二

2026230420

CORPORATE PROFILE

Japan Tobacco Inc. was originally established in 1898 as a government bureau to operate a monopoly in tobacco. In 1905, the Japanese government added salt to its operations, and in 1949, the bureau became Japan Tobacco and Salt Public Corporation. This corporation was Japan's sole producer of tobacco and salt products until April 1985, when it was privatized and reestablished as Japan Tobacco Inc., a joint stock company fully owned by the Japanese government. At present, the Company maintains its leading position in the domestic tobacco industry with an 87.9% market share while continuing to serve the public's needs for salt products. In terms of sales, Japan Tobacco is the fourth largest tobacco company in the world and also ranks as one of the companies in Japan with the highest turnover.

As one of Japan's largest companies with abundant financial, technical, and human resources at its disposal, Japan Tobacco is continuing to explore new business opportunities while strengthening its more recently acquired businesses. Main directions of growth where Japan Tobacco is aiming to carve a niche include pharmaceuticals, agribusiness, and engineering. These business areas, along with tobacco, are expected to form a new foundation for the Company in the 21st century and beyond.

2026230421

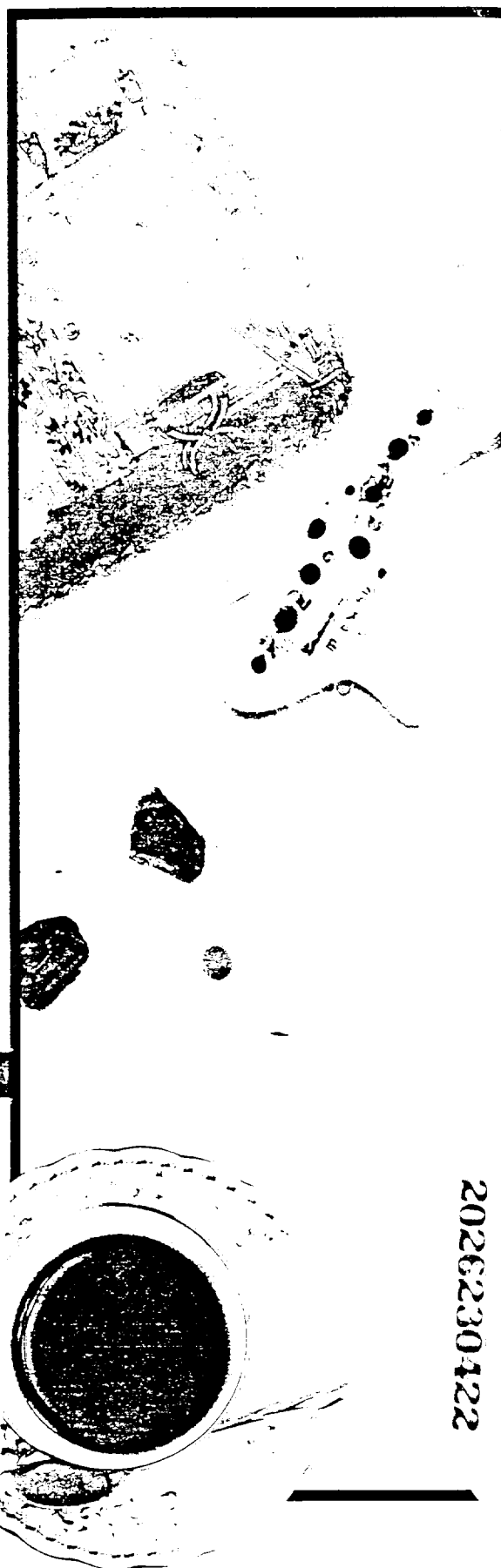
For nearly a century, Japan Tobacco has developed and honed its craft in the tobacco and salt industries. The Company is now recognized globally as an industry leader for its track record in research and technology in these industries. In Japan, we are regarded as a responsible and reliable corporate citizen, committed to the supply and development of quality products for our customers. While the Company remains obligated to serve the Japanese public as the sole agent and producer of salt products, gradual changes in government policy and rapid advances in technology have transformed its operating environment in tobacco. With privatization, Japan Tobacco is now in a better position to determine its own destiny by applying its accumulated technological expertise in areas outside of its present main areas of business.

Our roots lie in the tobacco and salt industries, but to meet and anticipate changes in our operating environment, we are seeking to expand our operations in both domestic and international markets. At present, we are continuing our diversification program into such areas as pharmaceuticals, agribusiness, and engineering. To better reflect these expanded operations, the Company elected to use "JT" as a communication logo in tandem with its corporate name, Japan Tobacco Inc.

Because our confidence to diversify

JT **EXPLORING NEW HORIZONS**

into new businesses originates from a rich history in the tobacco industry, we will continue to strengthen our tobacco business even as we seek to explore other avenues for growth in the future. This reflects our belief that strength in the tobacco industry will continue to play an important role in our future operations as we seek to better serve the needs of the community.



2026230422



June 1989

Shigeru Mizuno

Shigeru Mizuno
President and Chief Executive Officer

2026230423

In reviewing our business results for the year ended March 31, 1989, I am pleased to report on the progress we have made in working to enhance Japan Tobacco's operations. During the year, we worked to strengthen our competitiveness in the tobacco industry while continuing to expand our new areas of business.

Our Business Development

Although the Japanese economy remained strong in fiscal 1989 with an increase in overall consumption, our main business, domestic tobacco production, continued to face the challenges posed by leveled-off consumer demand for tobacco products and strict competition from other tobacco manufacturing companies. By meeting these challenges head on with the timely introduction of new brands developed to meet changing consumer tastes, extensive advertising, and sales promotion efforts, we were able to maintain a total market share of 87.9%.

Our growth in tobacco exports continued throughout fiscal 1989, increasing 62.0% in volume.

In addition to our tobacco business, we continued to pursue a program of diversification into such fields as pharmaceuticals and agribusiness for long-term future development. To fully utilize our resources and advanced technologies, we completely reorganized our research

Future Outlook

We believe that the domestic market for tobacco products will pose further challenges in the future based on frequently changing consumer tastes and ever intense competition. We plan to meet these challenges by responding flexibly to market demand by introducing innovative and creative products designed to meet varied consumer tastes. To attain the highest level of net income possible, we will continue to strengthen our product lines, reduce production costs, and enhance our marketing strategies. We also plan to continue promoting our tobacco exports worldwide in the interest of developing a global tobacco business.

Our diversification program will continue to play a major role in our future development. Founded on the advanced technologies, extensive distribution channels, and marketing capabilities developed through our tobacco activities, these areas of diversification—including pharmaceuticals, agribusiness, beverage production, and engineering—have been developed to provide consumers with a vast array of products specifically designed to meet market needs. We are committed to the development of prescription drugs that will help restore health and meet consumer needs. With these commitments, we are confident that our operations will increasingly

A MESSAGE FROM THE PRESIDENT

and development laboratories to best meet the needs of our new diversification programs. Also, we have initiated production and marketing of over-the-counter (OTC) drugs and of beverages through newly established companies. These efforts clearly illustrate the steady progress of our diversification program in fiscal 1989.

Although revenue contributions from our new businesses remain minor, our combined efforts in the tobacco and salt business helped us to achieve net sales of ¥2,723.9 billion (\$20.6 billion) and net income of ¥38.3 billion (\$290.0 million).

contribute to our growth.

Although our business environment does not allow us to be optimistic about the future, we believe that our accumulated experience of more than 90 years in the tobacco business will continue to provide a solid foundation from which future growth can be assured. In fiscal 1989 we took one more step toward strengthening that foundation, and we look forward to many more successful years to come.

2026230424

Japan Tobacco Inc.
Years ended March 31, 1988 and 1989

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
For the year:			
Net sales	¥2,797,856	¥2,723,962	\$20,636
Net income	36,889	38,328	290
At year-end:			
Shareholder's equity	¥ 976,184	¥1,006,443	\$ 7,625
Total assets	1,518,044	1,501,466	11,375
Amounts per share of common stock (in yen and U.S. dollars):			
Net income	¥ 13,803	¥ 15,633	\$ 118
Cash dividends	4,000	5,000	38
Shareholder's equity	455,405	467,004	3,538

Notes: 1. Figures stated in U.S. dollars in this report are translated solely for convenience at the rate of ¥132 per US\$1 as of March 31, 1989.

2. The amounts for net income, cash dividends, and shareholder's equity per share are related to the profit-oriented operations.

■ Through the development of new products and aggressive marketing, Japan Tobacco maintained its leading position in the Japanese tobacco industry with an 87.9% market share.

■ Tobacco exports rose 62.0% year to year in volume.

■ From April 1, 1988, Japan Tobacco's R&D activities were restructured to directly link each of the seven research arms with relevant operational divisions, and the Company also established two basic research organizations.

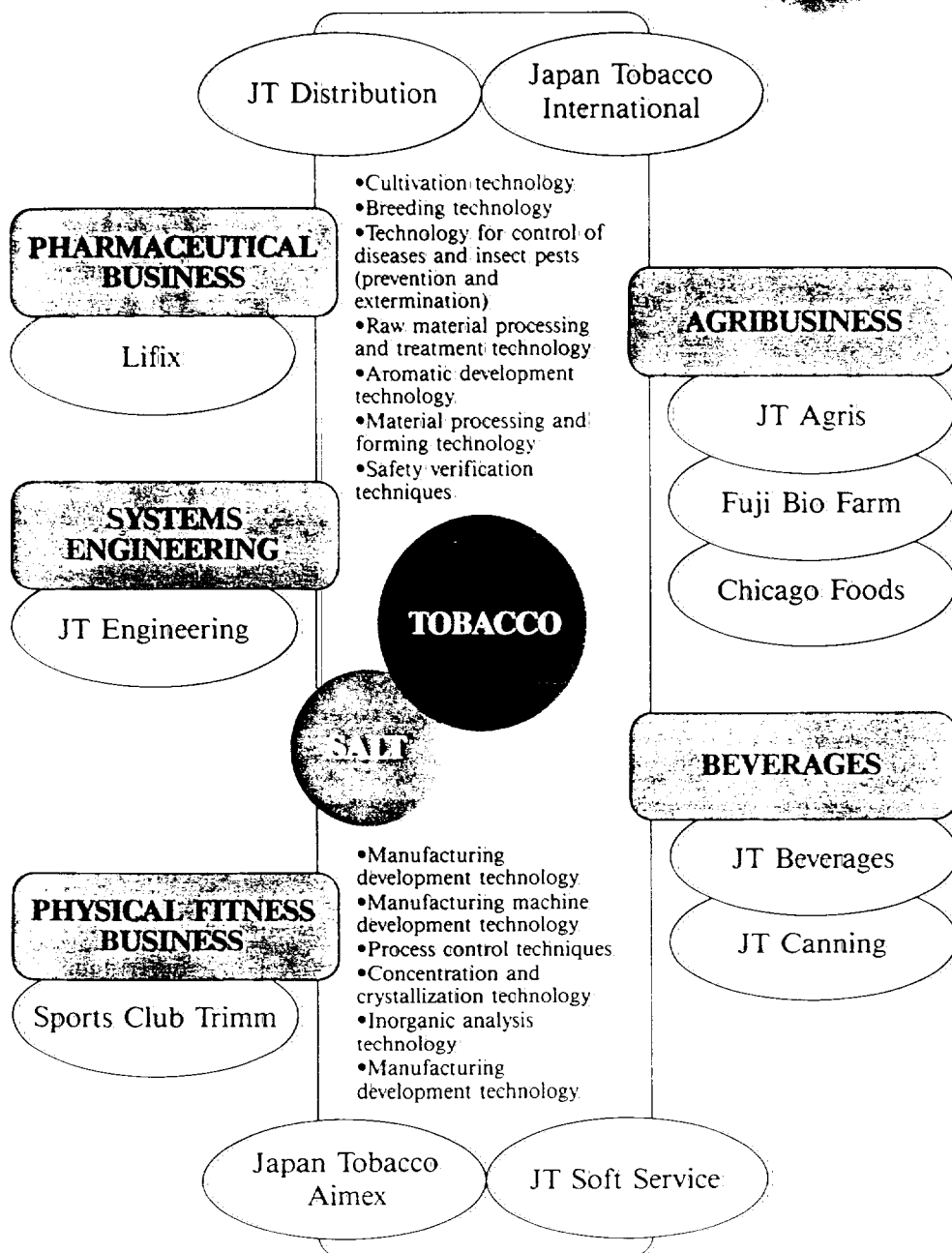
■ Japan Tobacco continued to diversify its activities by establishing new companies, such as Lifix Inc., and by entering into such new business areas as the beverage industry.

HIGHLIGHTS OF THE YEAR

CONTENTS

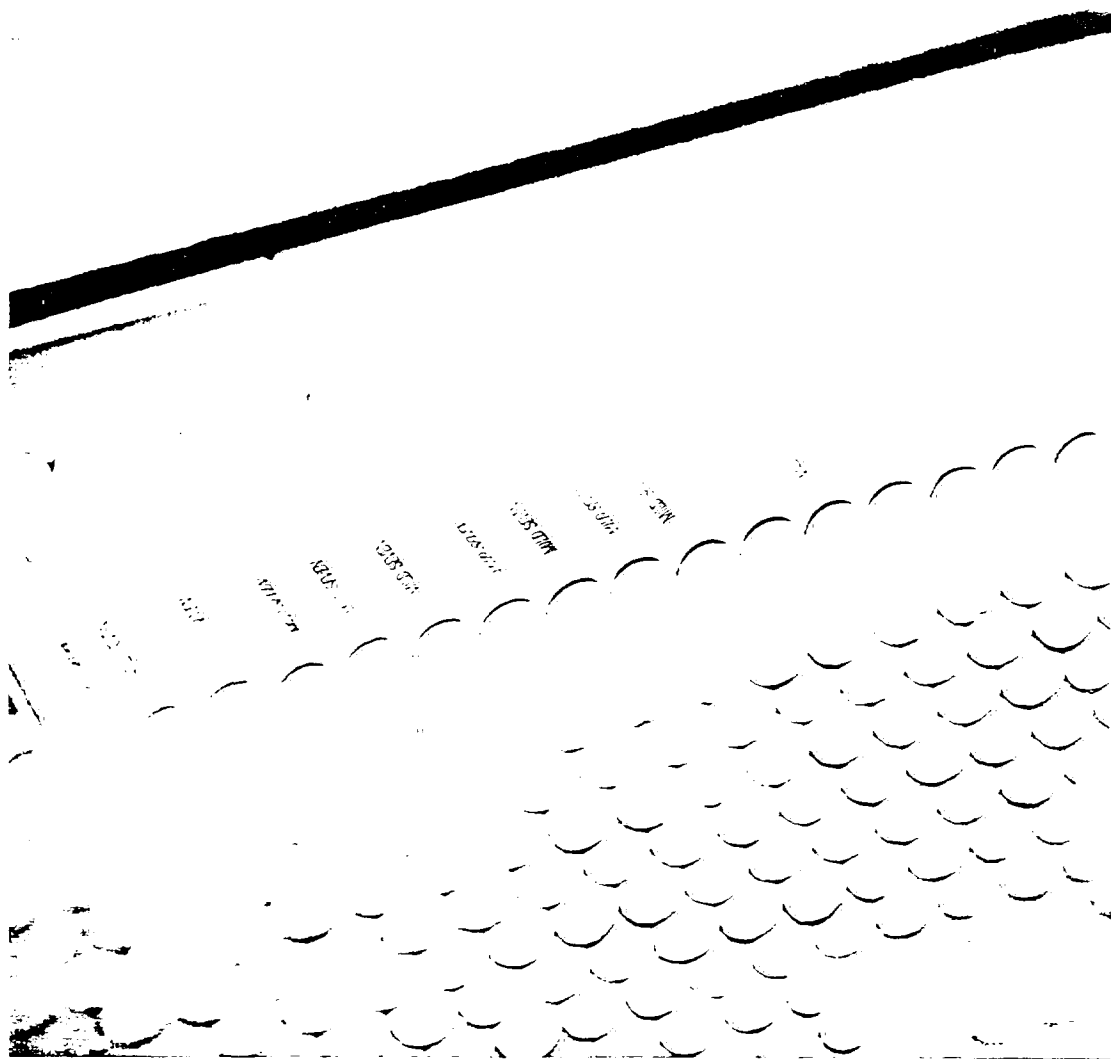
A MESSAGE FROM THE PRESIDENT ...	2
EXPLORING NEW HORIZONS ...	4
TURNING OVER A NEW LEAF ...	6
BRANCHING OUT ...	10
SOWING THE SEEDS OF FUTURE HARVESTS ...	14
HELPING PEOPLE GROW ...	16
DIRECTORS AND OFFICERS ...	18
FINANCIAL SECTION ...	20
OUR PRODUCT LINEUP ...	36
CORPORATE DATA ...	38
OVERSEAS OFFICES ...	38

2026230425



2026230426

The MILD SEVEN family, a major Japan Tobacco brand group, accounts for 46.7% of all cigarettes sold by the Company in the domestic market, while MILD SEVEN accounts for 55.0% of all cigarettes exported, indicating its recent growth as a global brand.



JT

TURNING OVER A NEW LEAF

From its early years as Japan Tobacco and Salt Public Corporation, the promotion of brand recognition has been a crucial part of the Company's marketing strategy for tobacco products. For example, one of its earliest cigarette brands, Peace, drew wide attention after the Company engaged an internationally recognized designer to redesign its package. In recent years, we have continued developing and promoting new brands while expanding existing brands for the domestic market. At present, there are more than 70 Japan Tobacco cigarette

brands on the market, and the Company's main brand, MILD SEVEN, now accounts for 26.0% of the Japanese market for cigarettes. Our other main brands, CASTER and CABIN, are also well known, with the number of smoking devotees increasing every year. These and other leading brand-name products represent one more aspect of our asset wealth.

In recent years, changes in market demand have led Japan Tobacco to review its future strategy. Therefore, we have shifted our energies toward

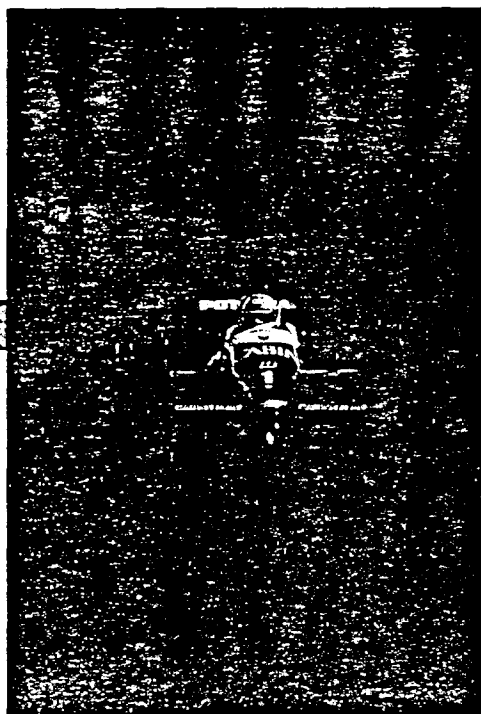
2026230427



"Tsukuba-1" is a new strain of tobacco leaf, developed through a haploid process, that is resistant to a diversity of diseases. Years of accumulated experience in the development of newly improved tobacco strains are being applied in new businesses.

improving our tobacco operations in anticipation of future changes. In addition to our three fundamental policies of lowering costs, increasing efficiency, and developing market-sensitive products, we have begun to focus more on internationalizing our operations as we seek to become a flexible, high-quality, and cost-competitive producer.

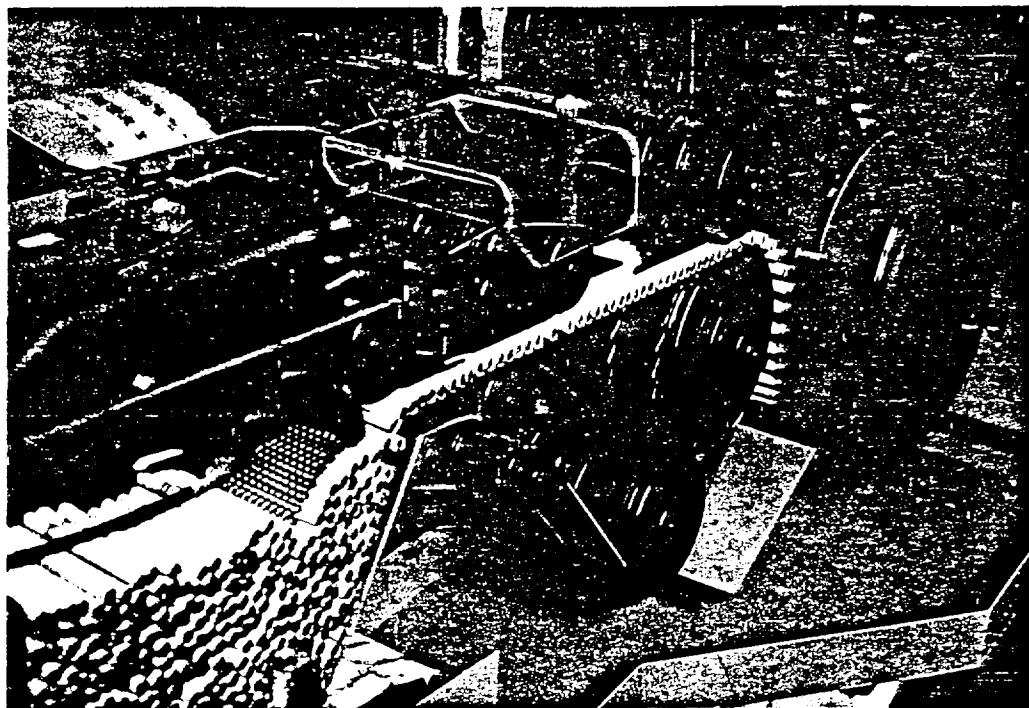
Efforts to cut costs include restructuring the domestic leaf tobacco procurement system, introducing the latest and most sophisticated tobacco making and packing equipment available for the



A major presence on racing tracks across the country is the CABIN Racing Team. Japan Tobacco also has a high profile in a wide variety of musical and sports events. These provide entertainment for spectators and work as a powerful marketing tool.

2026230428

The MMDP-8000, developed by the Company, is one of the world's fastest cigarette making machines, capable of producing 8,000 cigarettes a minute.



industry, and improving management efficiency through the usage of computers. While aiming for optimal usage of available personnel, the introduction of the MMDP-8000, one of the world's fastest cigarette making machines developed by Japan Tobacco, will allow the Company to save further on labor costs while increasing product quality. In addition to new large-scale computer network systems linking our plants and offices throughout Japan, an expert system helps us to avoid system crashes for the MMDP-8000.

Further efforts to raise efficiency have

business. In future years, we anticipate that our products will remain favored by the Japanese public, aided by dynamic contributions from our subsidiaries, JT Distribution, Japan Tobacco Aimex (leaf tobacco imports), JT Soft Service, and Japan Tobacco International (JATICO).

JATICO was established in 1984 to handle our international tobacco business. Since the establishment of JATICO, the growth of our international business has been phenomenal. In fiscal 1988, the volume of exports to more than 30 countries increased 82.0%

enabled us to trim inventory levels from the typical one month in 1985 to an average of 0.3 months at present, translating into substantial cost savings.

We are also continuing to improve and reorganize our operational structure to better serve the needs of major cities and urban areas in Japan. As the leading tobacco company in Japan, we are striving to meet the needs of all our customers by keeping a sharp eye on shifting market demands.

Through these measures, we are aiming to turn over a new leaf in our tobacco



Japan Tobacco is continuously introducing the latest, most sophisticated technology into its operations. Through such equipment as advanced computers, we are aiming to further automate the production process and raise the efficiency and speed of production machinery.



Overseas points of operations, such as Hong Kong, provide us with a springboard from which we can penetrate and expand our overseas business while serving as a constant monitor for changes in overseas markets.

over the previous year, and in fiscal 1989, exports rose an additional 62.0%.

MILD SEVEN represented 55.0% of total cigarette exports in fiscal 1989. This clearly indicates that MILD SEVEN is already a global brand.

The Company attributes its success to a growing recognition of its product quality throughout the world. For those markets to which export is nearly

impossible, such as the European Community, local production under license is being used and will continue to be implemented where necessary as a positive alternative to further the successful sale of our products in the future.

2026230430

Japan Tobacco's diversification program is a natural expansion springing from its roots in the tobacco industry and from its accumulated resources, such as R&D technological capabilities and real estate. For example, we have established sports clubs by utilizing our real estate resources. In addition, our sales distribution network, incorporating more than 270,000 stores nationwide, provides other opportunities for diversification. At present, while their contributions to total turnover are still minor relative to those from our established tobacco business, we are confident that these new businesses will grow to become additional areas of income support. On the following pages, we will present a short introduction to our business in the pharmaceutical, agribusiness, beverages, and engineering sectors, which represent our main new areas of operations.

Pharmaceuticals

In pharmaceuticals, we have already developed and manufactured a wide range of health-related products in OTC drugs so that people may enjoy healthier and higher-quality lifestyles. At present, our scientists at the Pharmaceutical Research Laboratories and the Toxicology Research Laboratories—where research in pharmac chemistry, biochemistry, pharmacology, pharmaceutical

development, and toxicology is being conducted—are in the process of developing sophisticated and advanced technologies and biotechnologies.

In prescription drugs, research activities involve the development of medicines to treat diseases of the central nervous system, the cardiovascular system, and cancer as the number of older people increases. The Company is aiming to apply the results of these research activities to marketable products as soon as possible through joint research work with various research organizations and pharmaceutical companies in Japan and overseas. In general, long years of research and substantial R&D investments are necessary to develop a new drug. Recently, 10 to 16 years and between ¥8 and ¥10 billion have become the norm for a drug to be developed and marketed. For this reason,



Lifex is aiming for future growth by taking full advantage of Japan Tobacco's extensive sales and distribution network and marketing know-how.

BRANCHING OUT



At the Company's pharmaceutical laboratories, a wide range of innovative research in synthetics, biochemistry, and drug formulations is paving the way for the development of new pharmaceutical products.

it is necessary to have a long-term plan and patience during the research, manufacture, and distribution phases to expand our pharmaceutical business. At present, we are continuing to strengthen our R&D staff, building from the current 130 scientists to reach a total of 400 at the earliest date possible. In two or three years, we are also planning to construct two R&D laboratories. In addition, a pharmaceutical agent is already in the second phase of clinical study, and we are in the process of establishing a manufacturing and sales structure for

2026230431



This is a photograph of molecular fusion. Japan Tobacco is already engaged in innovative R&D in biotechnology, which forms the technological basis for its agribusiness. At present, our scientists are concentrating on the development and application of major herbicides and nonpolluting agrochemicals.

this product, with a launch date targeted for 1994.

In April 1988, we established Lifix Inc. in a joint venture with Yoshitomi Pharmaceutical Industries, Ltd., a Japanese pharmaceutical company, to promote diversification into the OTC drug market. Lifix began marketing cold and stomach medicines and fever and cough suppressants in October 1988 and a medicinal drink in August 1988. These products are sold in nearly half of all domestic pharmacies and drugstores. Lifix's health drink, Royal Star, is being

Agribusiness

Agribusiness includes a diversity of integrated operations ranging from the supply of seedlings to foods. This area includes a seed business rooted in the latest biotechnology, plants for the living environment, and foods for an enriched life.

In the agricultural sector, our main objective is to contribute to the farming family through the supply of agricultural materials, such as seeds. Through its expertise accumulated over many years of research in the tobacco business and de-

distributed through our tobacco sales outlets, another example of utilizing our unique and extensive sales network.

In other health-related areas, Japan Tobacco is aiming to build a diversified business by taking a fresh perspective on the emerging and varied needs of its customers. Some examples of the Company's efforts include the supply of hospital food and the creation of "health boutiques," which are facilities incorporating a multitude of services in clinics, sports clubs, and pharmacies.

velopment of new tobacco varieties ahead of other companies in the industry, the Company has succeeded in applying its technologies in such fields as molecular fusion. At present, new types of flowers, vegetables, and cereals and grains are being developed mainly at the Plant Breeding and Genetics Research Laboratory and the Applied Plant Research Laboratory through the application of such technologies as genetic engineering and biotechnology. At the same time, we are aggressively working to develop fertilizers, herbicides, and

2026230432

other agricultural products that can be used safely and inexpensively. In addition, we have looked to team up with appropriate partners in Japan and overseas to deepen our knowledge in these areas and broaden the potential applications. Especially through tie-ups with the world-renowned biotechnology companies Plant Genetics Systems and Mycogen, we are endeavoring to develop new plant products and bioherbicides.

In foods, Japan Tobacco is aiming to establish a sound business foundation through offering products with superior nutritional value and taste and by targeting certain parts of the market. Examples include a subsidiary engaged in the mushroom business, Fuji BioFarm Corp., and another in the noodle and processed meat business, JT Agris Corp. These two companies offer specialized foods of distinctive quality. In addition, we established Chicago Foods Corp. in a joint venture with another company in July 1988. In July 1989, we opened our first gourmet hot dog restaurant in Roppongi, Tokyo, an area popular with young people, in our first step into the restaurant business. In addition, to develop various foods businesses that contribute to the establishment of a better diet, we are promoting research in ingredients, processing methods, and recipes at our Food R&D Center while tracking and analyzing prevailing food trends.

Beverages

In beverages, our engineers have used technology accumulated through many years of tobacco production to develop the HalfTime line of canned drinks, which offers our customers a variety of flavors and a distinctly delicate taste. Our knowledge of blending and aromas enabled us to produce aromatic essences closely resembling natural aromas and to use them to flavor beverages. In view of the potential growth the beverage industry has in Japan, we first targeted the canned beverage market, specifically beverages sold in vending machines, as the market with the highest growth potential.

Since our HalfTime product line of canned beverages was released in April 1988, consumer response has exceeded our original expectations. In addition to three prefectures and the Tokyo metropolitan area, we have expanded our sales area to include four prefectures surrounding Nagoya from February 1989. From June 1989, HalfTime will be sold throughout Japan in convenience stores.

Contributing factors to the popularity of Japan Tobacco's HalfTime product line have been its controlled sweetness aimed at the adult taste preference, its unified container and vending machine design, and the Company's already established strong network of vending machine locations. By making the can design uniform



We offer decorative greenery to beautify the urban home. Customer response has been very favorable for our simple garden sets and a variety of other decorative greenery products.

with that of the vending machine, we are aiming to raise public awareness of HalfTime and set it apart from ordinary canned beverage products. In addition, the strategic placement of HalfTime vending machines next to our tobacco vending machines increases product exposure while facilitating customer access.

2026230433



Our HalfTime series of delicately flavored drinks, which was developed through the most advanced technology, is rapidly increasing in popularity.

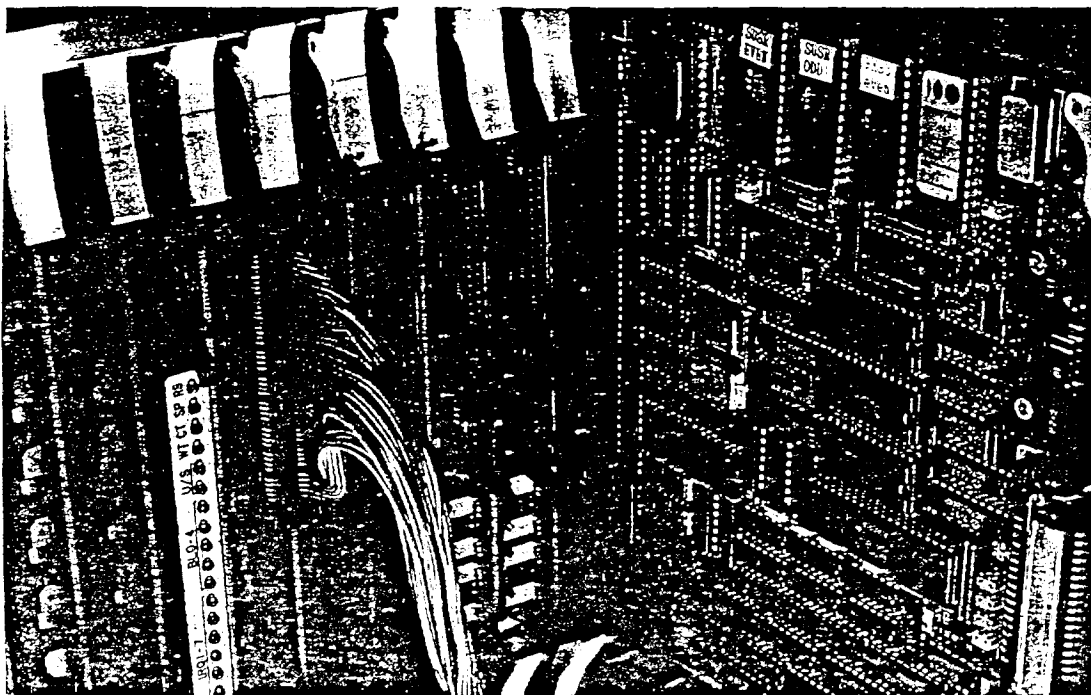
Engineering

During a century of operations in the tobacco business, Japan Tobacco has accumulated extensive know-how in the design and manufacture of machinery used in the tobacco production process. Our technical expertise in quality processing and control, for example, provides a platform from which the Company can venture into new business areas. At our Engineering Research Laboratory, six R&D teams work with such advanced equipment as infrared analyzers, expert systems, and CAD systems to research laboratory automation, factory automation, inorganic materials,

organic materials, information systems, and sensors.

This strong background in machinery technology enables us to offer our clients a diversity of engineering products and services ranging from sensors and high-speed precision machines for other industries to systems engineering for factory automation and laboratory automation, and to design and engineering services for plant construction.

In 1987, we established JT Engineering Inc. (JTE) to provide comprehensive engineering services. JTE assists us in domestic and overseas sales of tobacco product manufacturing equipment and in designing improvements in production at new plants. JTE's operations also include basic equipment design and consulting services. Although the bulk of its business is related to machinery for automated cigarette packaging, JTE also has experience in more than 12 other industries. We expect JTE's expertise in comprehensive engineering services to aid in its expansion not only in the domestic market but in such overseas markets as the Middle East and Southeast Asia.



The Company's engineering services, based on its leading worldwide tobacco production technology, are being actively applied in the tobacco industry and a wide diversity of other business sectors.

2026230434

Through more than 85 years of R&D activities in the tobacco industry, Japan Tobacco has kept ahead of new developments and more recently entered into new areas of business. In April 1988, we reorganized our R&D operations to obtain closer links with each operational division. At present, there are research centers at nine locations throughout Japan where specialists in each field work in teams. Of these centers, seven are directly linked to an operational division to facilitate rapid development of marketable products. The remaining two, the Tobacco Science Research Laboratory (TSRL) and the Life Science Research Laboratory (LSRL), are engaged in basic research with a view to developing new business areas for the long term.

Tobacco Science Research Laboratory

TSRL was established to engage in research for the development of innovative tobacco products. By exploring new technologies, this laboratory aims mainly to increase product quality, reduce costs, and develop new products. To develop prototypes for innovative products, TSRL is engaged in the development of new materials that can be used to gear products toward new trends and smoking tastes. Examples of such products include smokeless cigarettes, low-smoke-producing cigarettes, and cigarettes with built-in extinguishing



pleasant, mellow taste through the analysis of leaf tobacco. This involves examination of the composition of various aromas and substances in natural leaf tobacco, the development of liquid carbon dioxide and supercritical fluid

JT

SOWING THE SEEDS OF FUTURE HARVESTS

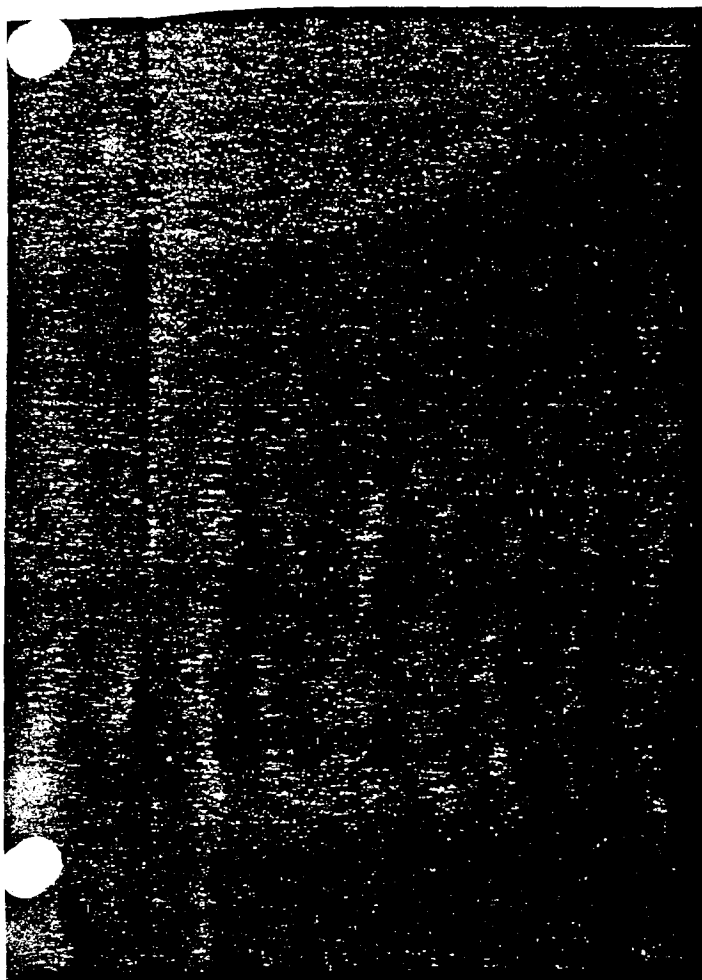
features. To develop these products, TSRL is also engaged in the development of technologies for vulcanization, swelling, and formulation of raw materials. In addition to application research, TSRL is responsible for new technological discoveries that will sow the seeds for basic, general research with a view to the long term.

Research at TSRL is divided into five areas: taste and fragrance, materials, smoke, analysis, and backup systems. In taste and fragrance, for example, TSRL is looking to develop a more

extraction technology, and research into the metabolic functions of microbes through fermentation to find ways to enhance the taste and fragrance of tobacco.

Future success in the tobacco industry lies in this kind of basic, ground-breaking research. Through these research activities, Japan Tobacco, as a leading Japanese company, aims to further contribute to the growth of the tobacco industry and the Japanese economy.

2026230435



Nuclear granules and chromosomes (HeLa cell mitotic phase): In analyzing carcinogenesis and cell differentiation mechanisms, the study of cellular and protein structures is very important. We are aiming to understand the functions of protein structures in these two fields.

proteins. In studying insect pheromones, LSRL is attempting to understand how male insects locate female insects through the detection of airborne pheromones, a chemical secreted by female insects.

LSRL has two main objectives in these research activities. The first is to open the door to the technological development of life models, which will enable breakthroughs in each business area. This involves 1) the development of fine chemicals through studies of controls for genetic discoveries and the development of revolutionary catalysts; both of these activities are based on the discoveries of basic, technological breakthroughs concerning life recognition mechanisms; and 2) the application of sensory and recognition research to advanced artificial intelligence robots.

The second main objective of LSRL is to develop potential future business avenues that will sustain our growth into the 21st century and beyond.

Life Science Research Laboratory

LSRL was established to research the recognition and response abilities of life forms using three paradigms: plant viruses, animal cells and proteins, and insect pheromones. In studying plant

viruses, LSRL has focused on RNA, a gene which has the ability to self-replicate. Through these efforts, researchers at LSRL have already succeeded in producing tobacco plants resistant to the cucumber mosaic virus (CMV) by inserting cDNA, a satellite RNA parasitic on CMV, into a tobacco nucleus.

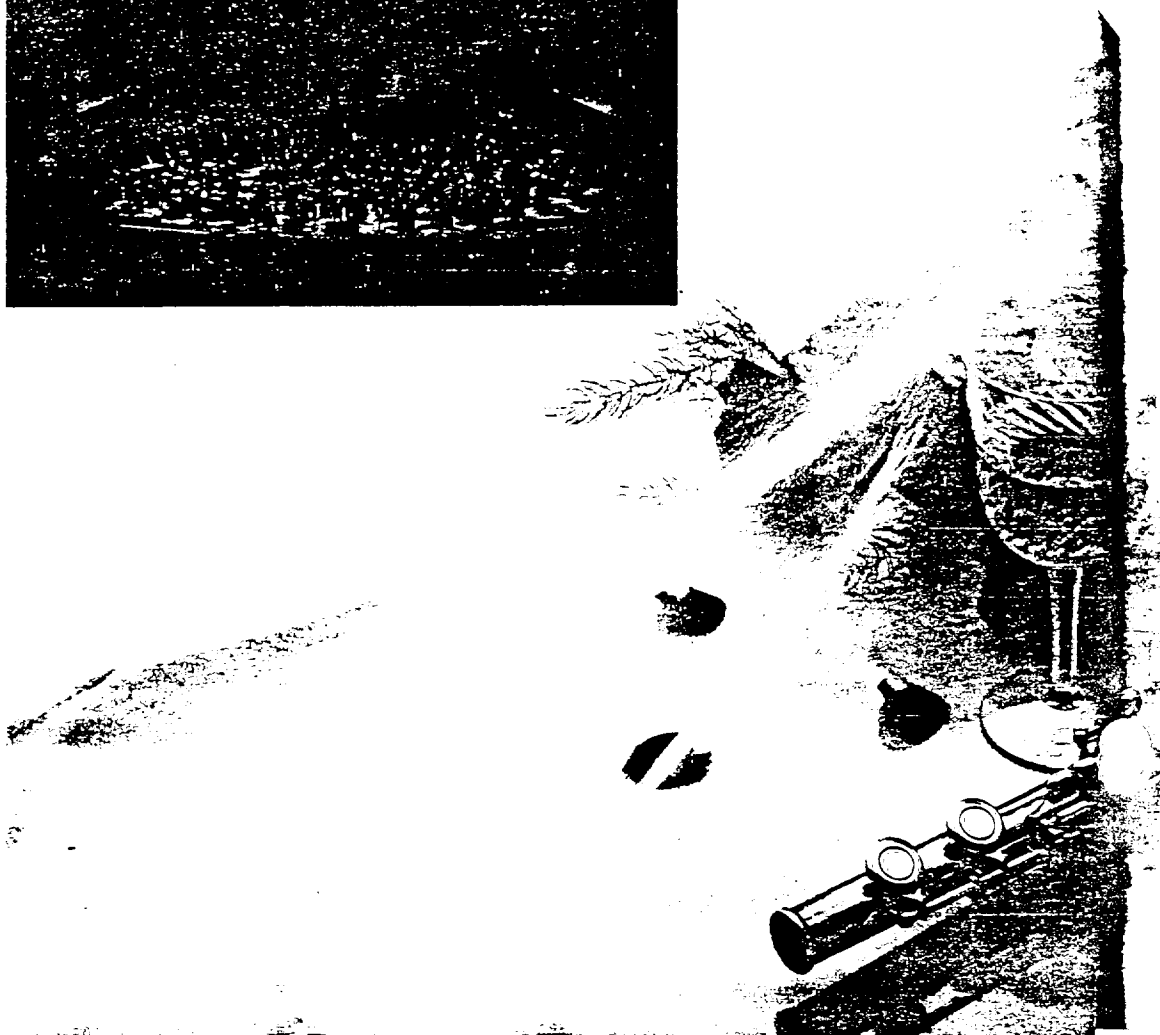
In the area of animal cells and proteins, researchers are studying mechanisms of cell differentiation and carcinogenesis through genetic engineering and X-ray crystallography to understand more about the structure and function of



Rotary evaporator: In search of increased quality, we are working to further expand the range of aromas and tastes, as well as the variety of our tobacco products by researching the natural aromatic particles and physiological activators present in leaf tobacco.

2026230436

Through the AFFINIS ARTS FOUNDATION, Japan Tobacco supports music performances. In 1989, the foundation's activities included the sponsorship of concerts and training sessions for musicians.



HELPING PEOPLE GROW

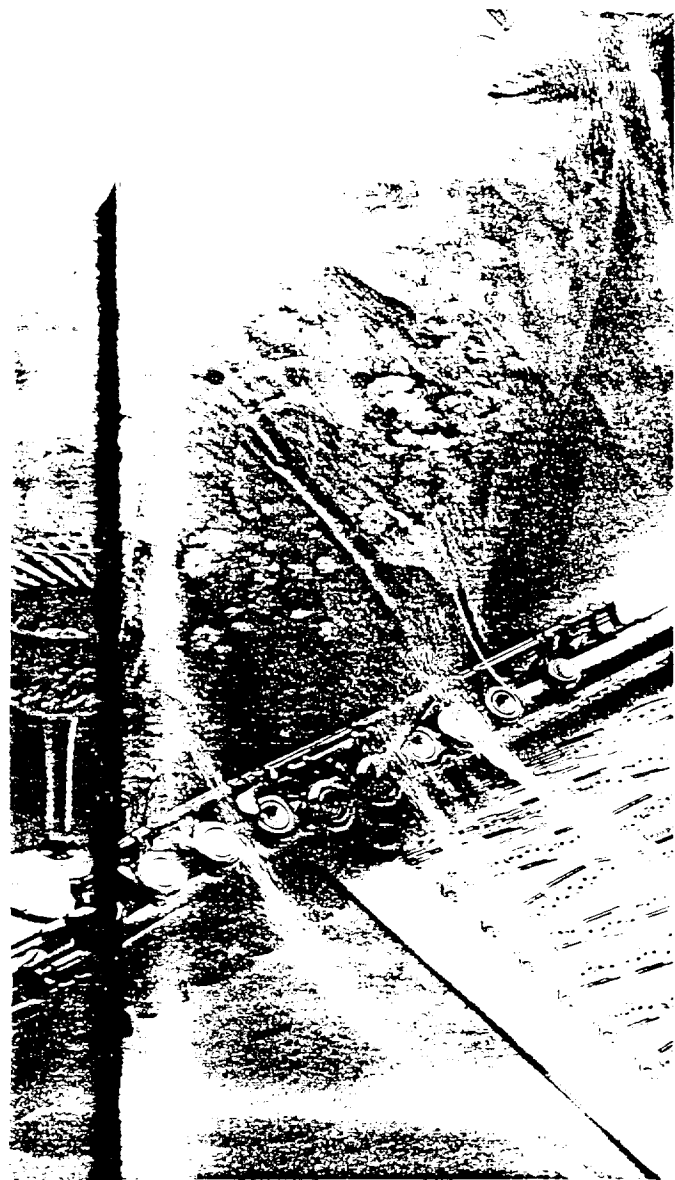
Japan Tobacco's most important corporate objectives are to serve the community and to make the world a better place to live. We have a long history of serving the public through the promotion of cultural activities and environmental campaigns, among other programs.

The Tobacco and Salt Museum, located in central Tokyo, first opened its doors to the public in 1978. Since then, many visitors have learned about the history and important uses of tobacco and salt in our lives through exhibits, mini-lectures, and field trips. This unique

museum has more than 22,000 items on permanent display through which the public can visualize the history of tobacco and salt. In addition, several special exhibits are held annually, covering topics of interest for the public.

Another method of fulfilling our responsibilities as a corporate citizen has been our "Smokin' Clean" campaign. Since 1963, we have endeavored to inform the Japanese public about the importance of keeping our living environment clean, and we have cooperated with fire safety officials to keep the

2026230437



sponsorship for concerts and other artistic activities as well as endowments for the training of performing artists. This foundation is one of the largest devoted to the musical arts in Japan.

In addition, Japan Tobacco is active in sponsoring various cultural and sports programs, including jazz festivals, motor races, a World Cup for sailing, classical music concerts, and monthly talk shows.



Our Tobacco and Salt Museum, a unique museum incorporating the history and culture of the salt and tobacco industries, is widely known and highly regarded in Japan.



At the Company's "Salt Experimental Classroom," which is held in major cities throughout Japan every summer, children experience the "mystery and fun" of salt.

public aware of the fire hazards associated with careless smoking. From early on, we installed ashtray stands in parks and other public facilities and gave away free portable ashtrays to prevent smokers from littering streets with cigarette butts. More recently, we have begun to emphasize such smoking etiquette as showing greater consideration for non-smokers.

In 1988, we established the AFFINIS ARTS FOUNDATION, our most ambitious plan so far to promote activities in the field of music. The objectives of this foundation include providing



Japan Tobacco has promoted its "Smokin' Clean" campaign for over 20 years. As a member of the corporate community, we will continue promoting courtesy among the smoking public.

2026230438



Kazuo Iwata



Shigeru Mizuno



Yasushi Endo



Kinya Katsukawa

JT

DIRECTORS AND OFFICERS

Chairman of the Board

Kazuo Iwata

President and Chief Executive Officer

Shigeru Mizuno

Senior Executive Vice Presidents

Yasushi Endo

Kinya Katsukawa

Executive Vice Presidents

Tsutomu Kamiwaki
Manufacturing, Machinery, Engineering

Tomoyuki Sato
Leaf Tobacco

Executive Directors:

Kiyotane Edayoshi
Salt Administration

Yutaka Wakushima
Marketing

Hideo Murayama
Pharmaceutical Business

Tatsuro Suzuki
Business Development and Affiliated Business; Beverage; Real Estate; Physical Distribution; Internal Audit

Kunio Kato
Fundamental Research, System Engineering

Jiro Sekiguchi
Public Relations, Personnel

Kazuya Niinomi
Domestic Leaf Tobacco

Corporate Counselor, Director

Tadayukii Ishii

Managing Directors

Hitoshi Oki
Kanto Regional Sales Headquarters

Hiroshi Goto
Planning, Finance, General Administration

Toshio Kikuma
Labor Relations

Nobuhiko Sagawa
Kansai Regional Sales Headquarters

Yukiteru Obi
General Manager of Applied Plant Research Laboratory

Tsutomu Eguchi
Manufacturing Information System

2026230439



Tsutomu Kamiwaki



Tomoyuki Sato



Kiyotane Edayoshi



Yutaka Wakushima



Hideo Murayama



Tatsuro Suzuki



Kunio Kato



Jiro Sekiguchi



Kazuya Niinomi

Yasuhiko Olee

Agribusiness

Ryuichi Yamada

Chubu Regional Sales Headquarters

Standing Auditors

Daisuke Ishibashi

Kazuo Ishii

Vice Presidents

Katsuhiko Honda

Planning

Nobumaro Kawashima

Technological Planning

Ryusuke Itoi

Information System

Keiji Takemoto

General Administration

Akio Niitsu

Public Relations

Makoto Ebara

Personnel

Susumu Yamaguchi

Real Estate

Yasuhiko Kato

Finance

Hideo Yamada

Physical Distribution

Takashi Ozaki

Internal Audit

Shigeru Ichinose

Business Development & Affiliated Business

Masayoshi Sato

Agribusiness

Masamichi Nishimoto

Pharmaceutical Business

Takashi Okada

System Engineering

Morihiko Sometani

Marketing

Seiichi Murakami

Product Planning

Hiroshi Yoshimura

Machinery Enterprise

Tamotsu Uchida

Mechanical Enterprise

Yasumasa Ito

Printing Enterprise

Hideyuki Yanaka

Purchasing

Yoichi Kitada

Overseas Leaf Tobacco

Tetsuro Tamura

Self Administration

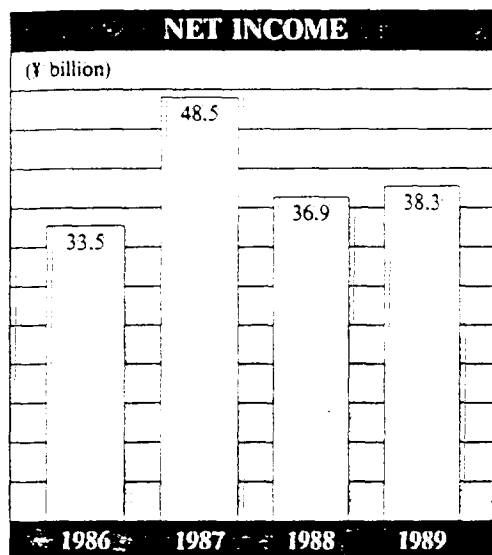
(As of June 28, 1989)

2026230440

CONTENTS

**REPORT OF INDEPENDENT CERTIFIED
PUBLIC ACCOUNTANTS**

20.



taking appropriate steps to meet present and possible future trends.

During fiscal 1989, the Company's best-selling tobacco brand, MILD SEVEN, continued to be the brand most favored by the Japanese public, with a 26.0% market share. The second most popular brand, MILD SEVEN Lights, had an estimated 14.7% market share. To maintain and further reinforce its image and dominant market position, the Company continued its program of carefully planned advertising and introduction of new products. New products introduced in the year under review include additions to the MILD SEVEN and CASTER families, MILD SEVEN FK, and CASTER MILD, in response to continued customer loyalty for these brands. In addition, SomeTime MIASS, an upmarket version of

the SomeTime LIGHT; Frontier, a super-low nicotine tar product; and CABIN 85 MILD Box, a hard-boxed package of CABIN 85 MILD, were introduced to customers. In addition, tobacco exports increased 62.0% in volume, to 4.3 billion cigarettes, due to sustained promotion of the Company's products in overseas markets by its subsidiary JATICO.

In fiscal 1989, the Company continued its diversification program by launching its beverage line, HalfTime; establishing JT Beverages to take charge of vending machine and other operations; and establishing Sports Club Trimm to promote health-related sports activities. On the international front, the production and export of vending machines and tobacco production machinery activities were continued. Other subsidiaries established in the year under review include Lifix, a joint venture company with a prominent Japanese pharmaceuticals company, and three other joint venture companies for the production and design of machinery and office equipment—JT CMK, JTS Denso, and JT Okamura. These three companies were all established with already available resources held by Japan Tobacco and represent another method of optimizing Company resources.

Since the Company's new business areas in agribusiness, pharmaceuticals, and engineering still represent only a tiny fraction of net sales, earnings contributions from these activities are shown together with tobacco sales in the Tobacco Business Division. While earnings contributions from new business areas remain insignificant relative to the Company's core business in tobacco, Japan Tobacco will continue its policy of dividing net sales into

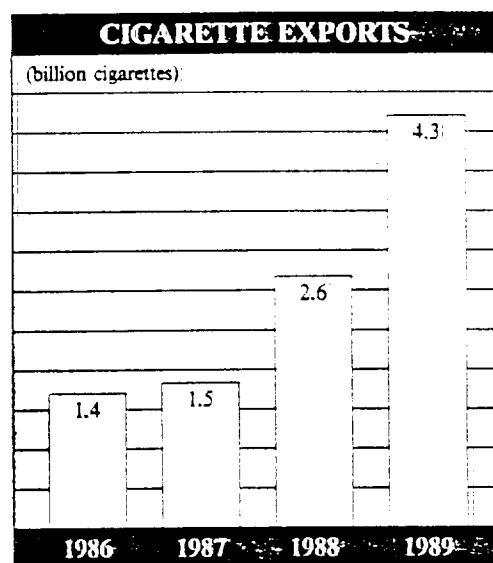
2026230442

its Tobacco Business Division or its Salt Business Division. However, the Company has been extremely pleased with the substantial growth many of its new business activities have shown in the year under review.

As a result of new brand introductions, increasing contributions from new operations, and vigorous promotional campaigns, total sales for the Tobacco Business Division in value only decreased 2.7%, to ¥2,654 billion, while tobacco sales volume decreased 3.2% from fiscal 1988, to 269.2 billion cigarettes, despite intense competition from foreign brands.

Lower national and regional taxes stemming from a decrease in tobacco sales volume contributed to lower cost of goods sold. In addition, the Company's efforts to rationalize production through the introduction of sophisticated equipment at its plants contributed to a 3.7% decline in cost of goods sold, to ¥88.2 billion, compared to fiscal 1988. However, substantial increases in promotional activities resulted in a 5.9% increase in selling, general and administrative expenses. This resulted in a 1.4% increase in operating profits, to ¥91.1 billion.

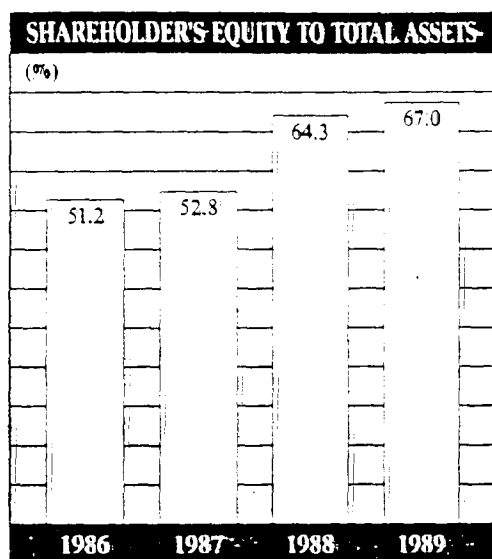
At the non-operating level, while income decreased ¥3.6 billion due to reduced interest income, expenses increased ¥550 million despite a decline in interest payments of ¥1.5 billion. This increase was mainly due to a rise of ¥2.9 billion in aid to leaf tobacco producers suffering from the negative effects of natural disasters. The result was a decrease of 3.0% in recurring profits, to ¥91.5 billion. Extraordinary losses of ¥19.6 billion stemming from a one-time payment to the Japan Leaf Tobacco Adjustment Fund resulted in a



further decline in pre-tax income. However, with lower corporate and regional taxes, net income from tobacco operations increased 13.3%, to ¥31.3 billion.

Salt Business Division

In its role as the sole supplier of salt in Japan, the Company continued to ensure stability in supply and prices throughout fiscal 1989 while working to steer its salt business toward future independent operations as directed in January 1987 by the Salt Provisional Committee. Salt sales for common use remained unchanged from fiscal 1988, at 1.2 million tons, while sales from salt supplied to the caustic soda industry increased 6.6%, to 70.8 million tons, as industrial activity remained strong. However, due to a domestic salt price cut from fiscal 1987, total salt sales decreased



1.1% in value from fiscal 1988, to ¥69.9 billion. A change in some aspects of the salt procurement system resulted in a rise in cost of goods sold. Selling, general and administrative expenses also increased 3.0% with the contribution of ¥1.5 billion to the Salt Science Foundation, resulting in a 37.1% decrease in operating income, to ¥4.5 billion. Net income of ¥7.1 billion was deposited in the reserve for salt monopoly price stabilization in accordance with the Monopoly in Salt Act.

Company Financial Position

Total assets decreased 1.1% compared to the previous year, to ¥1,501.5 billion. Inventories of leaf tobacco, which comprise over half of total assets, continued to be reduced during the year. As a result of a decline in purchase prices and reduced inventory levels, leaf

tobacco stock decreased 9.9% compared to the previous year, to ¥700.4 billion. Shareholder's equity, which is composed mainly of net income, increased ¥30.3 billion. However, because capital expenditures were nearly equivalent to depreciation expenses, the increased amount was placed in time deposits and marketable securities for fund management. This increased short-term investments, mainly time deposits and certificates of deposit, 54.6% compared to the previous year, to ¥141.3 billion. Current assets, which includes accounts receivable, decreased 2.1%, to ¥1,021.7 billion. Because capital investment was held at last year's level, property, plant and equipment did not increase significantly in the year under review; however, investments and other assets showed a slight increase.

Due to reduced corporate taxes, deferred taxes decreased ¥40.7 billion, and this contributed to the decline of ¥36.9 billion in current liabilities. There were no significant changes in non-current liabilities.

As a result of these factors, working capital increased ¥15.1 billion, and the liquidity ratio increased from 3.17 to 3.50. Shareholder's equity to total assets, reflecting increased retained earnings, continued to increase, rising from 64.3% to 67.0%. Net sales to total assets showed a minimal decrease from 1.84 to 1.81. As net income registered a moderate gain, total assets fell slightly.

2026230444

NON-CONSOLIDATED BALANCE SHEETS

Japan Tobacco Inc.
Years ended March 31, 1988 and 1989

	Millions of yen		Millions of U.S. dollars (Note 3)
	1988	1989	1989
ASSETS			
Current assets:			
Cash	¥ 75,661	¥ 80,454	\$ 610
Short-term investments, mainly time deposits and certificates of deposit	91,365	141,286	1,070
Trade notes and accounts receivable	12,117	14,397	109
Inventories (Notes 4 and 6)	854,148	769,235	5,828
Other current assets	10,185	16,309	123
Total current assets	1,043,476	1,021,681	7,740
Property, plant and equipment:			
Land	106,297	107,489	815
Buildings and structures	378,155	387,844	2,938
Machinery and equipment	318,275	322,096	2,440
Vehicles and tools	26,049	30,755	233
Construction in progress	6,381	2,934	22
	835,157	851,118	6,448
Less accumulated depreciation	413,972	430,031	3,258
	421,185	421,087	3,190
Investments and other assets:			
Investments in subsidiaries and associated companies	5,235	8,498	64
Investment securities	22,975	26,095	198
Other assets	25,173	24,105	183
	53,383	58,698	445
	¥1,518,044	¥1,501,466	\$11,375

2026230445

	Millions of yen		Millions of U.S. dollars (Note 3)
	1988	1989	1989
LIABILITIES AND SHAREHOLDER'S EQUITY			
Current liabilities:			
Short-term bank loans (Note 7)	¥ 56,000	¥ 61,000	\$ 462
Current portion of long-term debt (Note 7)	140	228	2
Excise taxes payable (Note 8)	158,352	150,097	1,137
Trade payables	46,847	52,311	396
Income taxes payable (Note 8)	55,757	15,042	114
Accrued employee bonuses	10,245	9,417	71
Other current liabilities	1,558	3,917	30
Total current liabilities	328,899	292,012	2,212
Non-current liabilities:			
Long-term debt (Note 7)	16,374	16,632	126
Liability for severance payments	189,294	185,579	1,406
Other non-current liabilities	7,293	800	6
	212,961	203,011	1,538
Commitments and contingencies (Note 12)			
Shareholder's equity (Notes 9 and 13):			
Common stock, ¥50,000 par value;			
Authorized—8,000,000 shares			
Issued and outstanding—2,000,000 shares	100,000	100,000	758
Capital fund of salt monopoly business	25,683	25,683	195
Additional paid-in capital	736,400	736,400	5,579
Legal reserve	1,600	2,400	18
Reserve for salt monopoly price stabilization	39,690	46,750	354
Retained earnings	72,811	95,210	721
Total shareholder's equity	976,184	1,006,443	7,625
	¥1,518,044	¥1,501,466	\$11,375

See notes to non-consolidated financial statements.

2026230446

NON-CONSOLIDATED STATEMENTS OF INCOME

Japan Tobacco Inc.
Years ended March 31, 1988 and 1989

	Millions of yen		Millions of U.S. dollars (Note 3)
	1988	1989	1989
Net sales	¥2,797,856	¥2,723,962	\$20,636
Cost of sales:			
Cost of products sold	659,892	630,201	4,774
Excise taxes on products sold (Note 8)	1,793,452	1,735,411	13,147
	<u>2,453,344</u>	<u>2,365,612</u>	<u>17,921</u>
Gross profit	344,512	358,350	2,715
Selling, general and administrative expenses	<u>230,457</u>	<u>253,461</u>	<u>1,920</u>
Operating profit	114,055	104,889	795
Other income (expenses):			
Interest income, net	6,201	6,470	48
Loss on disposals of property, plant and equipment	(475)	(3,479)	(26)
Other, net (Note 11)	<u>2,407</u>	<u>(23,012)</u>	<u>(174)</u>
	<u>8,133</u>	<u>(20,021)</u>	<u>(152)</u>
Income before income taxes	122,188	84,868	643
Income taxes (Note 8)	<u>85,299</u>	<u>46,540</u>	<u>353</u>
Net income	<u>¥ 36,889</u>	<u>¥ 38,328</u>	<u>\$ 290</u>

See notes to non-consolidated financial statements.

2026230447

NON-CONSOLIDATED STATEMENTS OF SHAREHOLDER'S EQUITY

Japan Tobacco Inc.
Years ended March 31, 1988 and 1989

	Millions of yen		Millions of U.S. dollars (Note 3)
	1988	1989	1989
Common stock	<u>¥100,000</u>	<u>¥100,000</u>	<u>\$ 758</u>
Additional paid-in capital	<u>¥736,400</u>	<u>¥736,400</u>	<u>\$5,579</u>
Legal reserve:			
Balance at beginning of year	¥ 800	¥ 1,600	\$ 12
Add:			
Transfer from retained earnings	800	800	6
Balance at end of year	<u>¥ 1,600</u>	<u>¥ 2,400</u>	<u>\$ 18</u>
Capital funds of salt monopoly business	<u>¥ 25,683</u>	<u>¥ 25,683</u>	<u>\$ 195</u>
Reserve for salt monopoly price stabilization:			
Balance at beginning of year	¥ 30,407	¥ 39,690	\$ 301
Add:			
Transfer from retained earnings	9,283	7,060	53
Balance at end of year	<u>¥ 39,690</u>	<u>¥ 46,750</u>	<u>\$ 354</u>
Retained earnings:			
Balance at beginning of year	¥ 54,050	¥ 72,811	\$ 552
Add:			
Net income	36,889	38,328	290
Deduct:			
Cash dividends, ¥4,000 per share	(8,000)	(8,000)	(61)
Bonuses to directors and statutory auditors	(45)	(69)	(1)
Transfer to legal reserve	(800)	(800)	(6)
Transfer to reserve for salt monopoly price stabilization	(9,283)	(7,060)	(53)
Balance at end of year	<u>¥ 72,811</u>	<u>¥ 95,210</u>	<u>\$ 721</u>

See notes to non-consolidated financial statements.

2026230148

NOTES TO NON-CONSOLIDATED FINANCIAL STATEMENTS

Japan Tobacco Inc.
Years ended March 31, 1988 and 1989

1. Organization and business

Japan Tobacco Inc. (the Company) was incorporated on April 1, 1985 as an ordinary business company, pursuant to the Nihon Tabako Sangyo Kabushiki Kaisha Law (the Law) enacted upon the resolution of the Japanese Diet.

Japan Tobacco and Salt Public Corporation (the Public Corporation), the predecessor of the Company, which had conducted tobacco and salt operations, was dissolved on the date of the Company's incorporation.

Upon incorporation, the Company, with the assets and liabilities of the Public Corporation, began the same operations as the Public Corporation, and is expanding its business in accordance with the diversification program connected with agribusiness, pharmaceuticals, engineering and real estate with the approval of the Japanese government. However, as the Monopoly in Salt Act (the Monopoly Act) is still effective, the salt operations, which are conducted in order to provide the nation with salt at a reasonable price and strengthen the foundations of the domestic salt industry, are regarded as a designation from the Government. Accordingly, the salt operations are not subject to the shareholder's rights and are basically exempt from income taxes.

As a result, the Company's assets and liabilities and the results of its operations should be separately accounted for between the profit-oriented operations represented by the tobacco business, and the salt operations.

Pursuant to the Law, the Government should keep more than one-half of the shares of the Company (two-thirds of the shares for the provisional term by the supplementary provisions of the Law); at present, all of the shares are held by the Government.

Considering the circumstances surrounding the Company described above, the Law and the Monopoly Act require that approval and authorization be obtained from the Minister of Finance regarding fundamentals such as: (1) the issuance of new shares and convertible debentures, (2) amendments to the Articles of Incorporation, (3) operating plan and (4) appropriations of earnings for the profit-oriented operations; and for the salt

operations: (1) operations plans, (2) budget, (3) plan of cash position, (4) borrowing of long-term loans and (5) financial statements.

2. Basis of presenting financial statements

The non-consolidated financial statements have been prepared in accordance with the provisions set forth in the Japanese Commercial Code and the related accounting regulations and the Monopoly Act, and in conformity with generally accepted accounting principles and practices in Japan. Under the Japanese Commercial Code, the Company is not required to prepare consolidated financial statements.

In preparing the non-consolidated financial statements, certain reclassifications and rearrangements have been made in the financial statements issued domestically in Japan in order to present these statements in a form which is more familiar to readers outside Japan. In addition, certain note information which is not required under generally accepted accounting principles and practices in Japan is presented herein as additional information.

3. Summary of significant accounting policies

a) Securities

Quoted marketable and investment securities are stated at the lower of cost or market, cost being determined on the moving average method. Other securities are stated at the moving average method.

b) Inventories

Profit-oriented operations:

Inventories mainly consisting of leaf tobacco are stated substantially at the average method.

In accordance with generally recognized practices, leaf tobacco is classified as current assets, although part of such inventories, due to the duration of the aging process, ordinarily will not be sold within one year.

Salt operations:

Inventories in salt operations are stated at the average method.

c) Property, plant and equipment

Property, plant and equipment are carried at cost. Depreciation is computed on the declining-balance method over the estimated useful lives of assets stipulated by the Japanese Corporate Tax Law. The useful lives of major assets are substantially 50 years for buildings and 8 years for tobacco producing machinery.

d) Investments in subsidiaries and associated companies

Investments in subsidiaries and associated companies (ownership: 20% to 50%) are stated at cost.

e) Income taxes

Income taxes are provided for amounts currently payable for each year. Deferred income taxes pertaining to timing differences in the recognition of certain income and expenses between financial and tax reporting are not recognized.

f) Retirement benefits

Under most circumstances, employees of the Company terminating their employment are entitled to lump-sum payments based on the rate of pay at the time of termination, years of service and certain other factors. The Company provides for retirement benefits to state the amount which would be required if all employees voluntarily terminated their employment at each balance sheet date. Provisions for retirement benefits include those for directors and statutory auditors of the Company. Such provisions are not funded.

g) Research and development expenses

Research and development expenses are charged to income as incurred.

h) U.S. dollar amounts

Amounts in U.S. dollars are included solely for the convenience of readers. The rate of ¥132=U.S.\$1, the approximate rate of exchange at March 31, 1989, has been used. The inclusion of such amounts is not

intended to imply that Japanese yen have been, could have been, or could be readily converted, realized or settled in U.S. dollars at that or any other rate.

4. Accounting change

Effective April 1, 1988, in order to meet the declining tendency of the purchase price, the Company changed its method of valuing leaf tobacco from the last-in, first-out method to the average method. This change had the effect of reducing inventories and income before income taxes by ¥20,936 million (\$159 million).

5. Transactions with subsidiaries

The transactions with and due from/(to) subsidiaries were as follows:

Transactions:

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
Sales	¥ 4,768	¥ 10,750	\$ 81
Purchases	42,769	101,262	767

Due from/(to):

Receivables	¥ 7,435	¥ 6,816	\$ 52
Payables	(5,717)	(13,846)	(105)

6. Inventories

Inventories at March 31, 1988 and 1989 comprise the following:

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
Profit-oriented operations:			
Leaf tobacco	¥777,200	¥704,728	\$5,339
Finished products	52,436	44,401	337
Other	20,955	17,043	129
	850,591	766,172	5,805
Salt operations:			
	3,557	3,063	23
Total	¥854,148	¥769,235	\$5,828

2026230450

7. Short-term bank loans and long-term debt

Short-term bank loans of ¥61,000 million are represented by 90-180 day notes bearing interest at the rate of 3.375% per annum and are not secured.

Long-term debt comprised the following:

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
5% Swiss franc bonds due 1994	¥14,305	¥14,305	\$108
4.4% to 5.3% unsecured loans from banks due 1993-1996	2,005	2,177	17
Unsecured loans from Bio-Oriented Technology Research Advancement Institution	204	378	3
	16,514	16,860	128
Less current portion	140	228	2
	<u>¥16,374</u>	<u>¥16,632</u>	<u>\$126</u>

The obligations created by the bonds are secured by a statutory preferential right, according to the Law, over the whole property of the Company. Unsecured loans from the Bio-Oriented Technology Research Advancement Institution are repayable from March 1992 through September 2001 with interest at the weighted average rate of 4.75% per annum.

8. Income taxes and excise taxes

The Company is subject to a corporate tax, inhabitants taxes and enterprise taxes based upon income from the profit-oriented operations, which in the aggregate, resulted in a normal statutory rate of approximately 56%.

The salt operations are exempt from income taxes with certain exceptions. The effective tax rates in the statements of income differ from the normal statutory rate, primarily because of the effect of timing differences, the effect of permanently non-deductible expenses, the lower tax rate applied to the portion of income distributed as dividends, tax credit for research and development expenditures, and the tax exemption of the salt operations.

The Company is also subject to national and local excise taxes, comprised of an ad valorem duty and a specific duty, on the tobacco products.

Excise taxes included in the cost of sales for the years ended March 31, 1988 and 1989 were as follows:

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
National	¥ 901,375	¥ 872,467	\$ 6,610
Local	892,077	862,944	6,537
	<u>¥1,793,452</u>	<u>¥1,735,411</u>	<u>\$13,147</u>

9. Shareholder's equity

Shareholder's equity items of the Company comprised those of the profit-oriented operations and those of the salt operations in accordance with the Japanese Commercial Code and the Monopoly Act.

The capital fund of salt monopoly business and the reserve for monopoly price stabilization in accordance with the Monopoly Act are not necessarily of the same nature as those required by the Japanese Commercial Code, because they have been deemed funds for the salt operations. The Company is also subject to the Japanese Commercial Code with regard to the profit-oriented operations.

As regards the profit-oriented operations, the Japanese Commercial Code provides that a portion of retained earnings in an amount equal to at least 10% of cash dividends be appropriated as a legal reserve until such reserve equals 25% of the amount of common stock. This reserve is not available for dividends, but may be used to reduce a deficit by resolution of the shareholder or may be capitalized by resolution of the Board of Directors.

In accordance with the Japanese Commercial Code, the appropriations of retained earnings and bonuses to directors including cash dividends have been reflected in the financial statements in the period in which they are approved at the shareholder's meeting to be held in the following year.

10. Amounts per share relating to the profit-oriented operations

Amounts of net income and net assets per share, relating to the profit-oriented operations, are computed based on the weighted average number of shares of common stock outstanding during each year and on the number of outstanding shares of common stock at each balance sheet date, respectively. The information referred to above follows:

Years ended March 31,	Yen		U.S. dollars
	1988	1989	1989
Net income per share	¥ 13,803	¥ 15,633	\$ 118
At March 31,	1988	1989	1989
Net assets per share	¥455,405	¥467,004	\$3,538

To compute the above figures, the net income and net assets relating to the salt operations have been excluded, owing to their not being subject to the shareholder's rights as described in Note 1.

11. Compensation to farmers

As a result of having ceased renewing contracts with farmers who had been contracted on a long-term basis, the Company paid ¥19,613 million (\$148 million) in 1989 as compensation.

The payments were included in "Other income (expenses)—Other, net" in the 1989 statements of income.

12. Commitments and contingencies

The Company is required to purchase all of the leaf tobacco produced, under the terms of the annual contract entered into with tobacco farmers, as stipulated in the Tobacco Business Code with regard to the method of purchasing the domestic crop. The purchase amount for the coming year is to be determined when the contracts are entered into with farmers, based upon the conclusions to be made by the Leaf Tobacco Council around September 1989.

The Company contracts various kinds of lease agreements. Annual rental expenses, primarily office premises, automobiles and computer equipment, came to ¥12,440 million and ¥19,230 million (\$146 million) for the years ended March 31, 1988 and 1989, respectively.

At March 31, 1989, the Company had no material litigations or claims outstanding, pending or threatened against it.

13. Subsequent event

The following plan for the appropriations of retained earnings for the year ended March 31, 1989 was approved at the shareholder's meeting held on June 28, 1989.

	Millions of yen	Millions of U.S. dollars
Cash dividends, ¥5,000 (\$38) per share	¥10,000	\$76
Transfer to legal reserve	1,000	7
Bonuses to directors and statutory auditors	711	1
	<u>¥11,071</u>	<u>\$84</u>

14. Profit-oriented operations

Under the Commercial Code and related accounting regulations, the Company is required to disclose the financial information of the profit-oriented operations together with the Company's financial statements which include the salt operations.

The financial information of the profit-oriented operations for 1988 and 1989 is shown on the following pages through page 34.

2026230452

PROFIT-ORIENTED OPERATIONS

FINANCIAL POSITION

March 31, 1988 and 1989

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
ASSETS			
Current assets:			
Cash	¥ 74,780	¥ 79,427	\$ 602
Short-term investments, mainly time deposits and certificates of deposit	52,277	95,247	721
Trade notes and accounts receivable	3,006	5,050	38
Inventories	850,591	766,172	5,805
Other current assets	10,126	15,591	118
Total current assets	990,780	961,487	7,284
Property, plant and equipment:			
Land	103,712	104,897	795
Buildings and structures	373,454	382,323	2,896
Machinery and equipment	318,241	321,989	2,439
Vehicles and tools	25,526	29,975	227
Construction in progress	6,381	2,934	22
	827,314	842,118	6,379
Less accumulated depreciation	412,013	427,064	3,235
	415,301	415,054	3,144
Investments and other assets:			
Investments in subsidiaries and associated companies	5,203	8,466	64
Investment securities	11,375	14,453	110
Other assets	24,656	23,535	178
	41,234	46,454	352
	<u>¥1,447,315</u>	<u>¥1,422,995</u>	<u>\$10,780</u>

2026230453

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
LIABILITIES AND SHAREHOLDER'S EQUITY			
Current liabilities:			
Short-term bank loans	¥ 56,000	¥ 61,000	\$ 462
Current portion of long-term debt	140	228	2
Excise taxes payable	158,352	150,097	1,137
Trade payables	44,773	49,627	376
Income taxes payable	55,756	15,041	114
Accrued employee bonuses	10,073	9,181	69
Other current liabilities	1,557	5,185	39
Total current liabilities	326,651	290,359	2,199
Non-current liabilities:			
Long-term debt	16,374	16,632	126
Liability for severance payments	186,318	181,194	1,373
Other non-current liabilities	7,161	800	6
	209,853	198,626	1,505
Commitments and contingencies			
Shareholder's equity:			
Common stock, ¥50,000 par value;			
Authorized—8,000,000 shares	100,000	100,000	758
Issued and outstanding—2,000,000 shares	736,400	736,400	5,579
Additional paid-in capital	1,600	2,400	18
Legal reserve	72,811	95,210	721
Retained earnings	910,811	934,010	7,076
Total shareholder's equity	¥1,447,315	¥1,422,995	\$10,780

2026230454

**PROFIT-ORIENTED OPERATIONS
RESULTS OF OPERATIONS**

Years ended March 31, 1988 and 1989

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
Net sales	¥2,727,151	¥2,654,025	\$20,106
Cost of sales:			
Cost of products sold	611,532	581,408	4,404
Excise taxes on products sold	1,793,452	1,735,411	13,147
	<u>2,404,984</u>	<u>2,316,819</u>	<u>17,551</u>
Gross profit	322,167	337,206	2,555
Selling, general and administrative expenses	215,268	236,816	1,794
Operating profit	<u>106,899</u>	<u>100,390</u>	<u>761</u>
Other income (expenses):			
Interest income, net	4,128	4,039	30
Loss on disposals of property, plant and equipment	(473)	(3,460)	(26)
Other, net	2,332	(23,246)	(176)
	<u>5,987</u>	<u>(22,667)</u>	<u>(172)</u>
Income before income taxes	112,886	77,723	589
Income taxes	85,280	46,455	352
Net income	¥ 27,606	¥ 31,268	\$ 237

**PROFIT-ORIENTED OPERATIONS
MOVEMENTS OF SHAREHOLDER'S EQUITY**

Years ended March 31, 1988 and 1989

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
Common stock	¥100,000	¥100,000	\$ 758
Additional paid-in capital	¥736,400	¥736,400	\$5,579
Legal reserve:			
Balance at beginning of year	¥ 800	¥ 1,600	\$ 12
Add:			
Transfer from retained earnings	800	800	6
Balance at end of year	<u>¥ 1,600</u>	<u>¥ 2,400</u>	<u>\$ 18</u>
Retained earnings:			
Balance at beginning of year	¥ 54,050	¥ 72,811	\$ 552
Add:			
Net income	27,606	31,268	237
Deduct:			
Cash dividends	(8,000)	(8,000)	(61)
Bonuses to directors and statutory auditors	(45)	(69)	(1)
Transfer to legal reserve	(800)	(800)	(6)
Balance at end of year	<u>¥ 72,811</u>	<u>¥ 95,210</u>	<u>\$ 721</u>

15. Salt operations

The salt operations started with the capital fund of salt monopoly business of ¥25,683 million (\$195 million) and the reserve for salt monopoly price stabilization of ¥11,298 million (\$86 million). Under the provisions of the Monopoly Act, the results of operations are credited to the reserve for salt monopoly price stabilization and the reserve may be used only to offset the losses from the salt operations.

Summarized financial information of the salt operations included in the financial statements follows:

	Millions of yen		Millions of U.S. dollars
	1988	1989	1989
At March 31,			
Current assets	¥53,241	¥61,514	\$466
Other assets	18,033	18,277	139
	<u>¥71,274</u>	<u>¥79,791</u>	<u>\$605</u>
Current liabilities	¥ 2,793	¥ 2,973	\$ 23
Other liabilities	3,108	4,385	33
	<u>5,901</u>	<u>7,358</u>	<u>56</u>
Capital fund of salt monopoly business	25,683	25,683	195
Reserve for monopoly price stabilization	39,690	46,750	354
	<u>65,373</u>	<u>72,433</u>	<u>549</u>
	<u>¥71,274</u>	<u>¥79,791</u>	<u>\$605</u>
Years ended March 31,	1988	1989	1989
Revenues	¥70,705	¥69,937	\$530
Costs and expenses	63,549	65,438	496
Other income, net	2,146	2,646	20
Income taxes	19	85	1
Net income	<u>¥ 9,283</u>	<u>¥ 7,060</u>	<u>\$ 53</u>

Tohmatsu Awoki & Sanwa
MS Shibaura Bldg.
13-23 Shibaura 4-chome,
Minato-ku, Tokyo 108
Telephone (03) 457-7321
Telex: 222-4616 TASAUD
Fax: (03) 457-1694

**△ Tohmatsu Awoki
& Sanwa**

To the Board of Directors
Japan Tobacco Inc.

We have examined the non-consolidated balance sheets of Japan Tobacco Inc. as of March 31, 1988 and 1989 and the related non-consolidated statements of income and shareholder's equity for the years then ended, all expressed in Japanese yen. Our examinations were made in accordance with generally accepted auditing standards in Japan and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the non-consolidated financial statements referred to above present fairly the financial position of Japan Tobacco Inc. as of March 31, 1988 and 1989 and results of its operations for the years then ended, in conformity with applicable laws and generally accepted accounting principles in Japan consistently applied during the period except for the change made in 1989, with which we concur, in the method of valuing inventories as described in Note 4 of the notes to non-consolidated financial statements.

The United States dollar amounts shown in the accompanying non-consolidated financial statements have been presented solely for convenience. We have reviewed this translation and, in our opinion, the non-consolidated financial statements expressed in Japanese yen have been translated into United States dollars on the basis described in Note 3 to the non-consolidated financial statements.

Tohmatsu Awoki & Sanwa

2028230456

May 15, 1989
(June 28, 1989 with respect to Note 13)

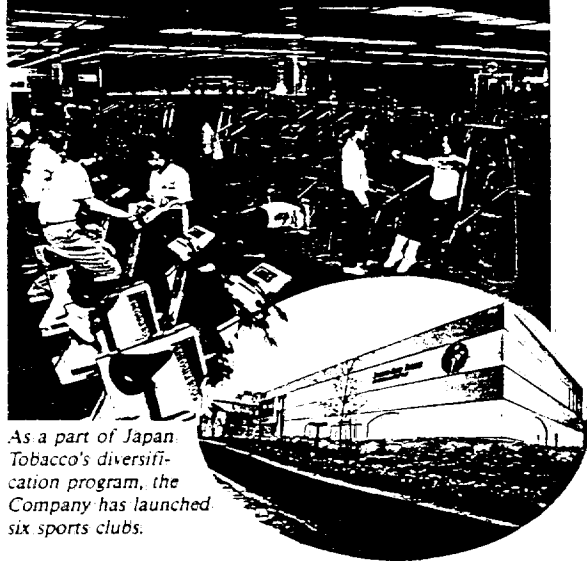
Touche Ross International

BEVERAGES



The HalfTime brand includes 23 different types of beverages. Nine of these feature herb additives to enhance the flavor.

PHYSICAL FITNESS BUSINESS



As a part of Japan Tobacco's diversification program, the Company has launched six sports clubs.

SALT PRODUCTION



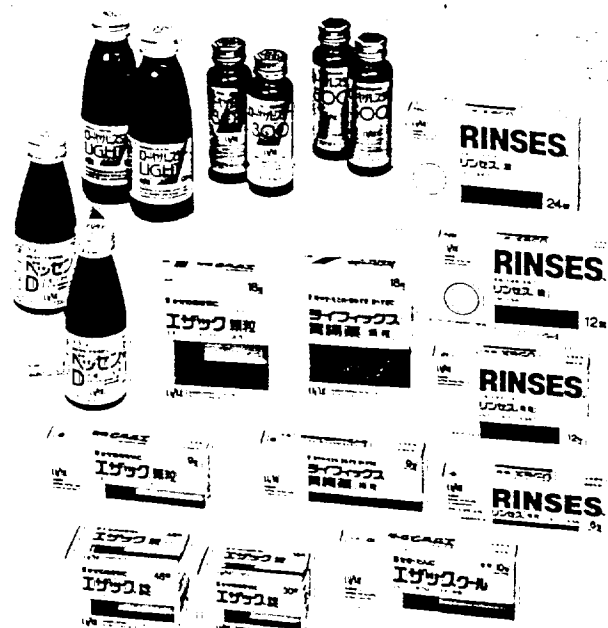
Easy-to-use packaging is an important feature of these salt products sold for home use.

TOBACCO PRODUCTS



Japan Tobacco's 103 tobacco brands meet a wide range of smoking tastes. At present, five brands are manufactured under licensing agreements.

PHARMACEUTICALS AND HEALTH DRINKS



Introducing various products marketed and developed by Lifix: 12 over-the-counter preparations for treatment of colds, stomach disorders, a medicinal drink, and 3 kinds of health drinks.

2026230458

Implementation

OUR PRODUCT LINEUP

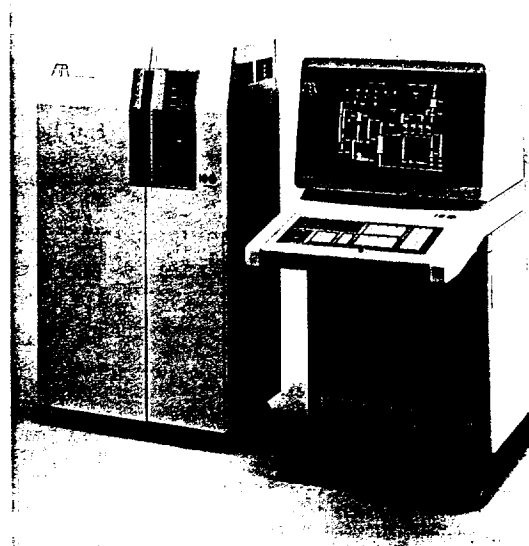


VENDING MACHINES



Vending machines attractively display Japan Tobacco's cigarettes and soft drinks. Sixteen types of these machines are in use for cigarette sales.

MACHINERY AND SYSTEMS



This sophisticated digital intelligent control system developed by Japan Tobacco is one example of the Company's capabilities to provide a wide range of equipment from tobacco manufacturing machinery to general-purpose manufacturing and control systems.

AGRIBUSINESS AND GARDENING SUPPLIES



The development of these gardening supplies, various food products, and other agricultural products is made possible through Japan Tobacco's extensive experience in agribusiness.

2026230459

CORPORATE DATA

Head Office
2-1, Toranomon 2-chome,
Minato-ku, Tokyo 105, Japan
Phone: (03) 582-3111
Fax: (03) 589-3153
Telex: J 24865

Date of Establishment
April 1, 1985

Paid-in Capital
¥100 billion

Number of Employees
26,700

Offices & Factories
Regional Sales Headquarters 3
Area Sales Headquarters 14
Sales Offices 257

Regional Leaf Tobacco Headquarters 8
Regional Leaf Tobacco Offices 1
Leaf Tobacco Offices 70

Cigarette Manufacturing Factories 32
Processing Factories and Another Factory 11

Machine Factories 2
Printing Factory 1

Salt Industry Centers 11
Salt Industry Offices 11

Support Service Centers 6
Hospitals 2

Laboratories
Applied Plant Research Laboratory
Leaf Tobacco Research Laboratory
Tobacco Science Research Laboratory
Pharmaceutical Research Laboratories
Food R&D Center
Life Science Research Laboratory
Sea Water Science Research Laboratory
Plant Breeding and Genetics Research Laboratory
Engineering Research Laboratory
Toxicology Research Laboratories
Product R&D Center

(As of April 1, 1989)

OVERSEAS OFFICES

New York Office
375 Park Avenue, Suite 1307,
New York, NY 10152, U.S.A.
Phone: 212-319-8990
Telex: 424015 (JTINC NEW)
Fax: 212-319-8993

Raleigh Office
4700 Homewood Court, Suite 240,
Raleigh, NC 27609, U.S.A.
Phone: 919-782-1076
Telex: 230-579475 (AAB: JTINC RAL)
Fax: 919-833-6208

Washington Office
1667 K Street N.W., Suite 330,
Washington, D.C. 20006, U.S.A.
Phone: 202-293-4289
Telex: 751629 (JTINC WSH UD)
Fax: 202-887-5506

London Office
Albemarle House, 1 Albemarle Street,
London W1X 3HF, U.K.
Phone: 001-44-1-408-0240
Fax: 001-44-1-499-1211

Düsseldorf Office
Immermann Tower, 2nd Floor,
Immermann Str. 40, 4000, Düsseldorf 1,
F.R. Germany
Phone: 0211-352557
Fax: 0211-365957

Athens Office
49, Vas Sofias Avenue,
10676, Athens, Greece
Phone: 1-723-2282/0108
Telex: 601-216255 (AAB: 216255 JTI GR)
Fax: 1-721-7309

Thessaloniki Office
7, 28th October Street,
54642, Thessaloniki, Greece
Phone: 31-838-808
Telex: 601-410655 (AAB: 410655 JTIS GR)
Fax: 31-846-865

Bangkok Office
8th Floor, Thaniya Bldg.,
62 Silom Road, Bangkok 10500, Thailand
Phone: 2-236-0125/9123
Telex: 86-82922 (AAB: 82922 JTINC BKTH)
Fax: 2-236-9123

São Paulo Office
Japan Tobacco do Brasil
Pesq. de Merc. s/c Ltda.
Av. Paulista 949, 20º Andar C. J. 202,
Bela Vista, São Paulo-S.P.-Brasil CEP-01311
Phone: 11-285-4699/4675
Telex: 38-1132669 (AAB: 1132669 JTSP BR)
Fax: 11-285-4675

Manila Office
7th Floor, Maripola Bldg.,
109 Perea St., Legaspi Village,
Makati, Metro Manila, Philippines
Phone: 2-8160492
Fax: 2-8160569

Beijing Office
Room No. 2248, Minzu Hotel,
Fu Xing Men, Nei Da Jie, 51 Hao,
Beijing, The People's Republic of China
Phone: 6011635
Telex: 22735 (JTC BJCN)
Fax: 601-5694

Izmir Office
1381 Sokak, No. 19-2,
Alsancak, Izmir, Turkey
Phone: 51-214-937
Telex: 607-53636 (AAB: 53636 JTI TR)
Fax: 51-215-156

Overseas Offices of Japan Tobacco International Corporation

JATICO U.S.A. Inc.
2441 205th Street, Suite C-102,
Torrance, CA 90501, U.S.A.
Phone: 213-212-6416
Fax: 213-533-8027

**Japan Tobacco International
(HK) Ltd.**
828 Ocean Centre, Tsimshatsui,
Kowloon, Hong Kong
Phone: 852-3-7361733
Telex: 45178 (Tabak HX)
Fax: 852-3-739-8709

JATICO Trading(s) Pte. Ltd.
Unit No. 158, Tagore Lane,
Upper Thomson, Singapore 2678
Phone: 65-455-5388
Telex: 50155 (JTCSIN RS)
Fax: 65-455-0405

Taipei Office
International Trade Bldg., 1910,
333, Keelung Road, Sec. II,
Taipei, Taiwan
Phone: 2-738-2450
Fax: 2-757-6440

Seoul Office
Room No. 805-B, Miwon Bldg.,
43, Youido-Dong, Yong, Dong po-Gu,
Seoul, Korea
Phone: 2-782-0506/0507
Fax: 2-782-0509

2026230460

J JAPAN TOBACCO INC.
2-1, TORANOMON 2-CHOME, MINATO-KU, TOKYO 105, JAPAN
PHONE: (03) 582-3111
FAX: (03) 589-3153
TELEX: J 24865

2026230461

J1

T S R L

くつろぎの科学

The Science Behind Relaxation

2026230462

日本たばこ産業株式会社

たばこ中央研究所

JAPAN TOBACCO INC.

TOBACCO SCIENCE RESEARCH LABORATORY

最先端の科学技術を駆使し、たばこ文化の未来を拓く

The future for tobacco and its enjoyment using the latest science and technology

日本たばこの研究開発活動は、85年以上の歴史をもち、常に基本を大切に、着実な研究を重ねてきました。

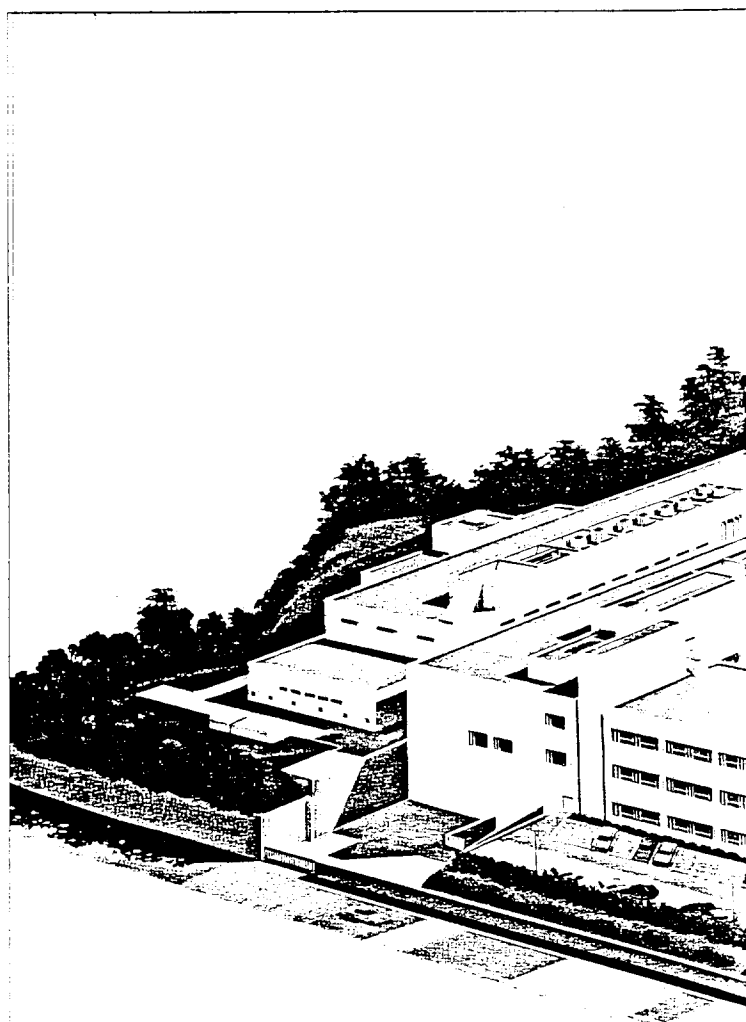
昭和63年4月に発足した“たばこ中央研究所”は、時代の声に応え、たばこの次世代商品への進化を現実のものとするための研究開発につとめています。

日進月歩する科学技術を駆使して、より洗練され高度化された新商品を創出し続けることが、研究所の使命であると考えています。

この小冊子では、研究開発の歴史や背景をはじめ、現在“たばこ中央研究所”がおこなっている研究活動についてご紹介します。

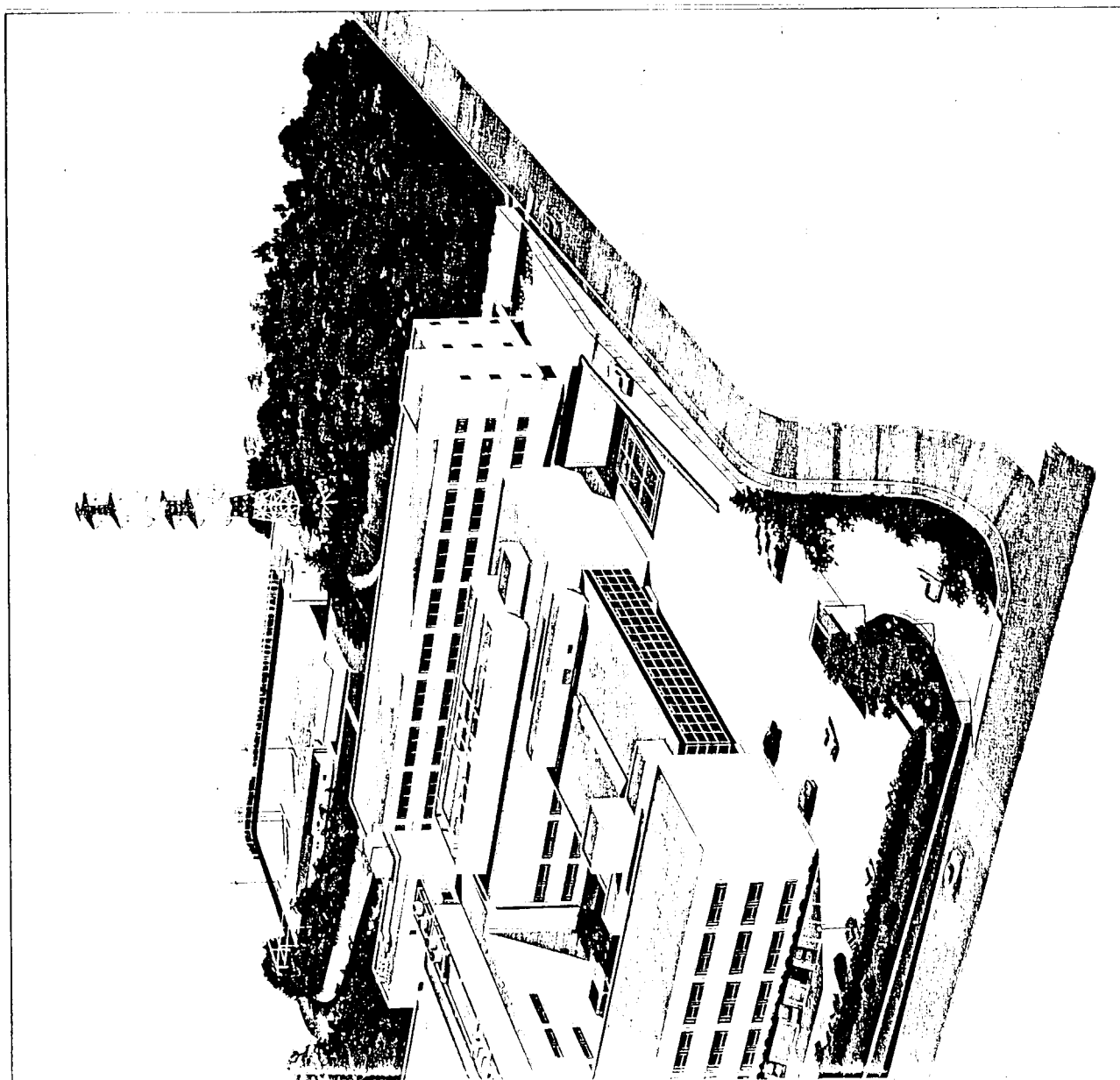
The Tobacco Science Research Laboratory (TSRL) was inaugurated in April 1988 to support research developing the tobacco of the future.

敷 地 total area 34,520m²
建面積 area of building 9,590m²
延面積 total floor space 22,350m²



2026230463

2026230464



さらなる技術革新を目指して
Continuous pursuit of technological innovation

田本たばこ産業では、たばこを中心に、アグリ、バイオ、ケミカル、ドラッグからエレクトロニクス、エンジニアリングにいたる多角的な事業の展開を開始しました。昭和62年には、たばこ事業、塩専売事業に加えて、アグリ事業、医薬事業などの事業部体制をスタートしました。それとともなって研究開発体制も各事業部に直結させ、より幅広いものとして整備されました。

なかでも各研究所の基幹となるたばこ中央研究所は、たばこをめぐる新技術の開発を通して、たばこの品質向上、コスト低減、および新商品の開発を基本目標としています。また、これら目的達成型の研究と同時に、長期展望に立った基礎的研究と新しい技術シーズの探索をおこなうことも、本研究所に託された大きなテーマです。

The basic goals of TSRL are improving the quality and lowering the price of tobacco products through the development of appropriate new technology, as well as creating new products made possible by this innovation. The Institute is also entrusted with basic scientific research and open-ended research on technological possibilities in the long run.

新商品開発に向けて
Development of tomorrow's tobacco products

香煙 煙草製品部 Tobacco Division

葉たばこ Leaf tobacco

システムエンジニアリング部 Systems Engineering Division

事業部門別本社地方機関組織図

Organization

▶ 本社	Head Office
▷ たばこ事業	Tobacco Business
原料本部	Leaf Tobacco Headquarters
製造本部	Manufacturing Headquarters
営業本部	Marketing Headquarters
機械事業部	Machinery Enterprise Division
特機事業部	Mechanical Enterprise Division
印刷事業部	Printing Enterprise Division
システムエンジニアリング事業部	Systems Engineering Division
医薬事業部	Pharmaceutical Division
アグリ事業部	Agribusiness Division
塩専売事業部	Salt Administration Headquarters
支援部門	Support Service Centers

● ブレンド・調香	blending・flavoring	
● 新原料の開発	development of new raw materials	
● 原料の高度利用	development of new raw materials	
● 煙成分の改良	improvement of the composition of tobacco smoke	● 新商品 new products
● 官能検査	sensory test	
● 加工処理	leaf processing	
● 新香料の開発	development of new flavor substances	

新しい商品の創造へ向けて、香料・フィルター・巻紙などの開発、煙成分の制御の研究等を進めています。
In order to develop tomorrow's tobacco products, TSRL is conducting steady research effort in various fields of tobacco production; flavor, filter, cigarette paper, composition of tobacco smoke and so forth.

▶ 地方機関 Offices & Factories

● 原料本部(8)	Regional Leaf Tobacco Headquarters	● 原料事務所(55) Leaf Tobacco Office	● 支所(15) Branch
● 地方原料事務所(1)	Regional Leaf Tobacco Office		
● 葉たばこ研究所	Leaf Tobacco Research Laboratory		
● (葉たばこ技術センター(3) Leaf Tobacco Technology Center)			
● たばこ工場(32)	Cigarette Manufacturing Factory		
● 原料工場等(11)	Processing Factory		
● 製品開発センター	Product R&D Center		
● 営業本部(3)	Regional Sales Headquarters	● 営業所(257) Sales Office	
● 支店(14)	Area Sales Headquarters		
● 機械製作所	Machine Factory		
● 明石製作所	Machine Factory		
● 京都印刷工場	Printing Factory		
● 生産技術研究所	Engineering Research Laboratory		
● 医薬研究所	Pharmaceutical Research Laboratories		
● (安全性研究所)	Toxicology Research Laboratories		
● 植物開発研究所	Applied Plant Research Laboratory		
● 遺伝育種研究所	Plant Breeding and Genetics Research Laboratory		
● 食品研究所	Food R&D Center		
● たばこ由来研究所	Tobacco Source Research Laboratory		
● 生命科学研究所	Life Science Research Laboratory		
● 塩業センター(1)	Salt Industry Center	● 塩業事務所(11) Salt Industry Office	
● 海水利用研究所	Sea Water Science Research Laboratory		
● 事務センター(6)	Support Service Center		

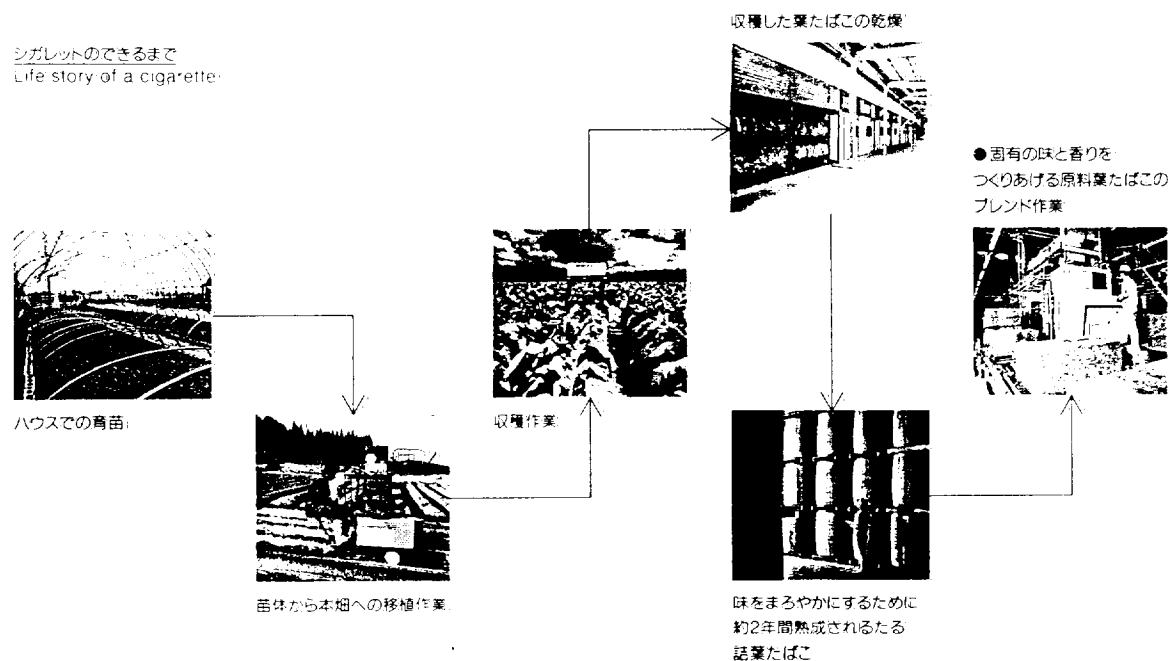
1本のたばこに込められる科学と技術 Science and Technology Incorporated into a single cigarette

たばこの味や香りは、原料となる葉たばこの生育条件などによって、微妙に変化します。そこで“日本たばこ”では、新品種の導入や栽培技術の改善などに努力する一方で、海外から国産のものとは異なる品質特性をもった葉たばこを輸入するなどして、ニーズの多様化に対応できる、良質な原料の確保につとめています。また、製造工程においてはコンピュータなどを駆使した最新技術を導入、優れた品質を安定して供給するためトータルな品質管理体制を実現しました。

たばこ中央研究所が開発した基礎技術や研究成果は、これらの工程の随所に生かされ、品質管理や新商品開発などに応用されています。

A cigarette's flavor and aroma partially depend upon the conditions under which the leaf tobacco was grown. Besides introducing new varieties and cultivation techniques to domestic tobacco growers, JT imports specific foreign tobacco, to ensure top quality ingredients capable of satisfying our customers' diverse needs. We also provide total quality control of production using state-of-the-art technology.

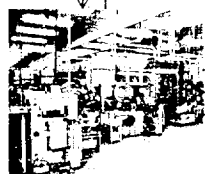
シガレットのできるまで
Life story of a cigarette



2026230467



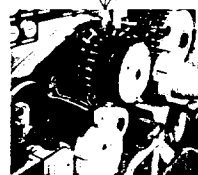
●製品ラインアップ



●1分間に5,000本を巻き上げる
直結形巻包機



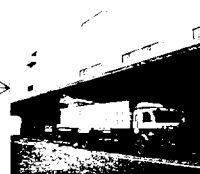
●包装工程



●巻上工程



●工程ラインを
集中コントロールする制御室



●出荷



店頭での販売

●たばこ中央研究所の
研究成果が応用される工程
The process by which
TSP's research findings
are implemented

2026230468

有機的に連環する5つの研究グループ Five interdependent research groups

たばこ中央研究所の研究領域は、大きく5つに分類することができます。味と香り、材料、煙、分析、そして支援システム——これら5つの研究グループの有機的な連環によって、たばこ研究の全体像が鮮やかに描き出されます。

たばこ中央研究所の総合的な研究成果は、さらに“日本たばこ”の他の研究所の研究成果をも含みながら、以下のような大きな目標に向かって統合されていきます。

●次世代商品のプロトタイプとして、新喫煙形態を指向した製品の開発。たとえばニコチンを付加したスモークレス製品、低副流煙・自己消火製品など●技術シーズとしてのたばこ原料の硬化・膨化・成型技術の開発。および、高圧ガスによる香料の抽出・分離技術、特定成分の濾過・吸着技術の追求●バイオテクノロジーを駆使した耐病・耐虫品種の作出、およびたばこ有用成分発現遺伝子の発見とその組み換え●たばこ工場の生産性向上のための技術開発。トータルプロセスにおける効率化・自動化の推進

くつろぎの科学 The Science Behind Relaxation

主要研究テーマの分野
Main research fields



②

材料の科学
次世代のフィルターと巻紙の創出のために
Materials science
Creating innovative filters and the papers



2026230469

TSRL's research objectives roughly focus on five fields——flavor and aroma, materials, smoke, analysis and supporting systems——which work together as an organic whole.

Some of the major themes of research are:

- The development of prototypes for major innovations in smoking.
- Developing techniques of tobacco stiffening and bulking as well as aroma extraction and the filtering out and adsorption of certain smoke components.
- Pioneering biotechnology to create disease and insect-resistant strains of tobacco, as well as discovering and splicing genes with useful properties.
- Technology development to improve tobacco plant productivity.



①

味と香りの科学

ゆたかさともろやかさを求めて

The study of flavor and aroma

Pursuing the pleasant and mellow



④

分析の科学

より厳密な物理・化学的特性の解明に向けて

Analytical research

Clarification of physical and chemical properties by more rigorous constraints



⑤

研究開発支援システム

最先端機器とノウハウを研究に生かす

R&D support system

Supporting research with the latest in technology and equipment



③

煙の科学

理想的な喫煙条件を実現するために

The appreciation of smoking

Ideal smoking conditions.



The study of flavor and aroma
Pursuing the pleasant and mellow

たばこ原料である葉たばこには1000以上の成分が含まれ、さらにそれが燃えることによって、特定されているものだけでも4000を越す成分に変化します。たばこの味と香りは、多くの化学成分の微妙なバランスによって形づくられているといっているでしょう。またアメリカブレンドの登場・普及以降は、香料を加えることによって味と香りのバラエティがさらに広がっています。

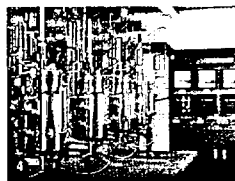
葉たばこ等の分析により香気成分の本体を解明すること、そして葉たばこの長所を生かし欠点をおさえる香料を開発することが、味と香りの研究の目的です。葉たばこや各種天然物の香気成分・生理活性成分の研究、液体炭酸や超臨界ガスを用いた香料および活性物質の抽出分離技術の開発、発酵技術を利用し微生物の代謝機能を使った香料生産や香気味改善などの研究をおこなっています。



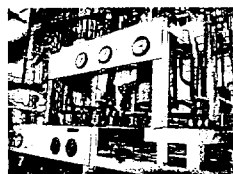
The following types of research are underway:
Research into the composition of various natural aromas and biologically active substances;
development ~~of liquid carbon dioxide and supercritical fluid extraction technology for aromatic and other active materials~~ research to develop flavor and aroma-improving technology based on the metabolic functions of microbes utilizing fermentation technology.



- ① 野生種(アンブラチカ)
- ② ロータリーエバポレーター
- ③ 無菌室
- ④ ジャーファーマンター
- ⑤ 香料サンプル
- ⑥ 高速液体クロマトグラフ
- ⑦ 高圧ガス抽出装置



- ① Wild plant
Numburatica
- ② Rotary evaporator
- ③ Bio-clean room
- ④ Jar fermenter
- ⑤ Tobacco flavor
- ⑥ High performance
liquid chromatograph
- ⑦ High pressure
extractor



2026230472

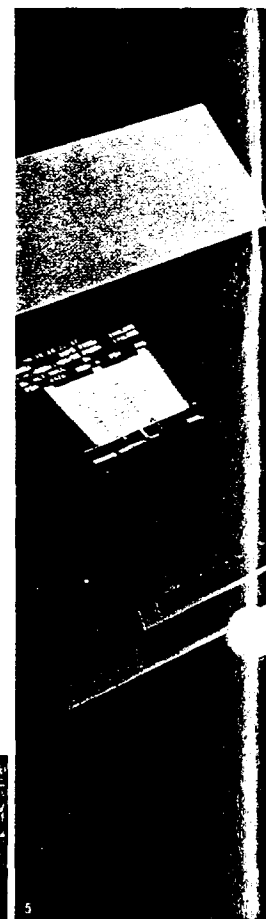
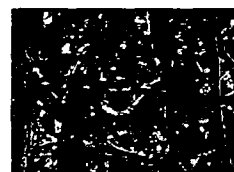
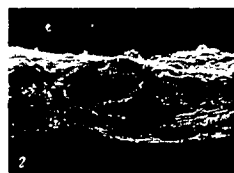
Materials science

Creating innovative filters and papers

原料たばこや香料をはじめとして、フィルターや巻紙は味や香りに大きく影響しています。またパッケージ材料は商品イメージと深くかかわっています。とりわけ低ニコチン・低タールシガレットが主流になった現在、これら材料品の研究開発成果は、新商品の開発と密接に結びついています。

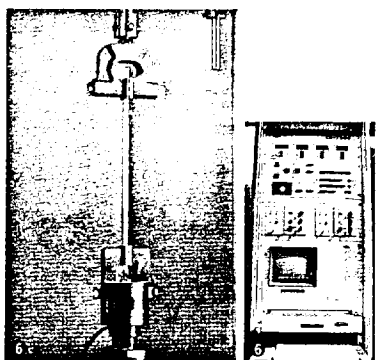
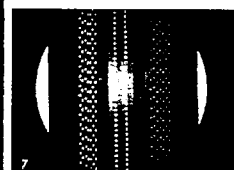
新規のフィルター、巻紙、包装材およびフィルター素材の開発、フィルター製造技術の開発を通じて、魅力溢れたシガレットの愛煙家への提供と材料品のコスト低減を目指しています。また商品設計機能の高度化を目的として、材料品の濾過、吸着、希釈、拡散機能によるニコチン、タール、ガス成分の調節機構を解析し、煙成分調節設計技法の確立を図っています。先端テクノロジーによる吸着剤、触媒などの高機能化の研究にもチャレンジしています。

The research covers the development of new filter materials, functional cigarette papers and manufacturing technology of new filters to improve tobacco products; and investigating the mechanism of filtration, adsorption, dilution and diffusion of smoke components by the filter and/or cigarette paper to control smoke delivery.



- ① フィルター見本
- ② 巻紙断面の顕微鏡写真
- ③ 巻紙開孔部の拡大写真
- ④ 試験用巻紙
- ⑤ X線マイクロアナライザーで
走査電子顕微鏡
- ⑥ 引っ張り試験機
- ⑦ 万能投影機で見た
開孔チップペーパー

2026230473



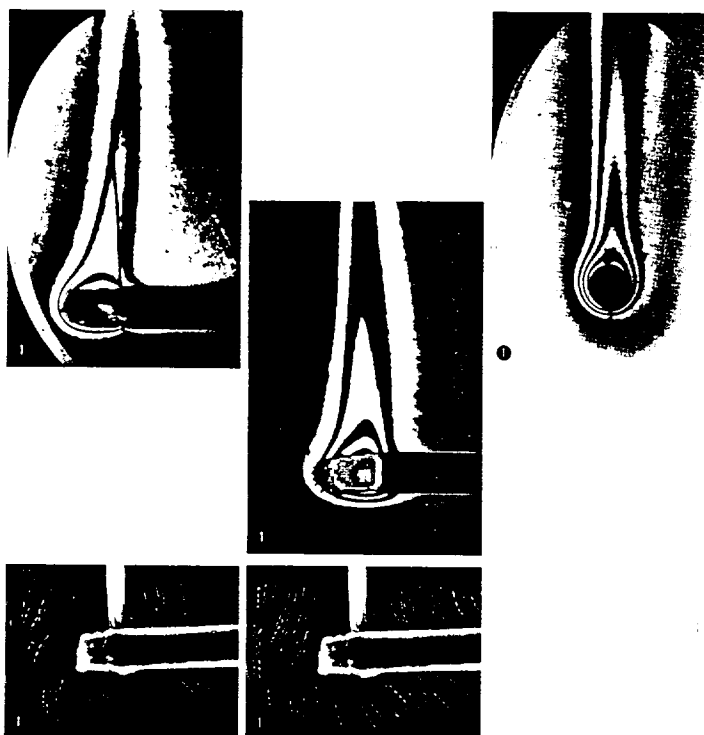
- ① Cigarette filters
- ② Microscope photograph of cigarette paper
- ③ Microscope photograph of perforated cigarette paper
- ④ Cigarette papers
- ⑤ X-ray microanalyzer
- ⑥ Tensile testing instrument
- ⑦ Perforated tipping paper

13 Materials

2026230474

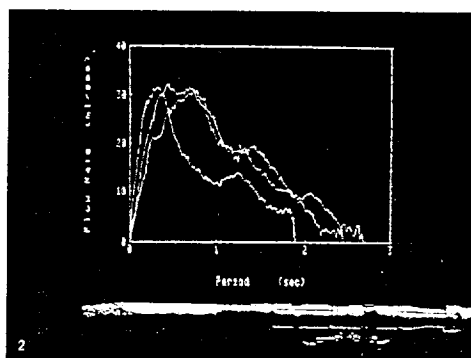
The appreciation of smoking:
Ideal smoking conditions.

同一種類のたばこでも、温度・湿度や吸い方など喫煙時の物理的ファクターによって、その風味は微妙に異なります。また煙の化学的成分も、同じ嗜好品であるコーヒーの数10倍とも言われるほど、複雑で多様です。これら喫煙時の物理・化学的諸条件と味覚との対応関係を明らかにする作業は、これまで人間の経験に頼る部分が多かったのですが、最新の測定装置を駆使することなどにより、客観的データを蓄積することが可能になりました。またシガレットの燃焼および煙粒子の生成機構の研究、副流煙や環境中の煙粒子・ニコチン・においの濃度測定法とその低減化技術に関する研究など、煙というデリケートな対象をめぐる様々な研究をおこなっています。

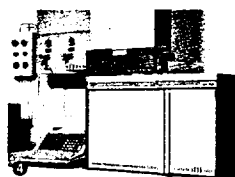


- ① 喫煙時の煙温度、
空気の流れ
- ② 喫煙プロフィール測定装置
- ③ 喫煙器
- ④ ガスクロマトグラフ

To find desirable smoking conditions and to cope with environmental problems related to smoking, research is being carried out on the mechanism of combustion and smoke particle production of the cigarette. The effects of physical and chemical properties of smoke on the taste of the cigarette are investigated by sensory tests. These relations can be evaluated objectively by using the latest measuring apparatus.



2026230475



- Temperature profile and a flow pattern during a puff
- Puff profile monitoring system
- Smoking machine
- Gas chromatograph

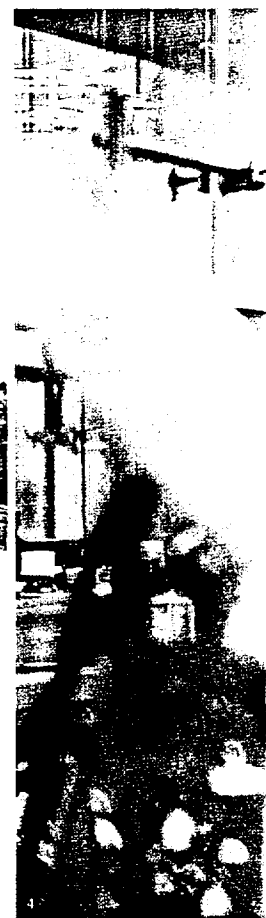
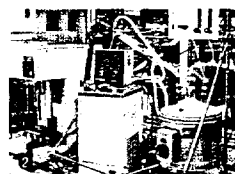
Analytical research

Clarification of physical and chemical properties by more rigorous

葉たばこのレオロジー的性質や化学成分は、製品としてのたばこの品質を大きく左右し、喫煙時に発生する熱と水分は、たばこ自体の物理的特性を変化させます。さらに喫煙後の灰の状態なども、たばこを総合的にとらえる場合の重要な要素となります。

これら原料としての葉たばこや材料品の物理・化学特性を多方面から解析し、製品の改良・開発に役立てることを目的として、様々な測定・実験がおこなわれています。物性および物性改善技術の研究としては、刻・たばこ巻の物性測定法の開発、刻の力学的特性の解明、たばこの喫煙・燃焼時の熱と水分移動現象の解明、たばこ刻の硬化・膨化法の技術開発をおこなっています。また有機化合物の構造解析も分析グループの大きな役割の一つです。

This research includes the development of methods measuring the physical and chemical properties of shredded and wrapped tobacco, investigating the nature of heat-release and moisture-movement, and development of new techniques to improve stiffening and bulking tobacco shreds.

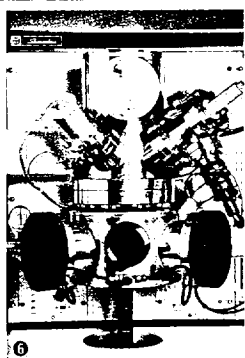


- ① 巻き硬さ測定装置
- ② 熱機械測定装置
- ③ 電子顕微鏡
- ④ 分析室
- ⑤ 分析サンプル
- ⑥ ESCA
- ⑦ FTIR



2026230477

constraints



- ① Cigarette hardness tester
- ② Thermomechanical analyzer
- ③ Electron microscope
- ④ Laboratory
- ⑤ Samples
- ⑥ ESCA
- ⑦ FTIR

17 Analysis

2026230478

研究開発支援システム

最先端の機器・ノウハウを研究に生かす

R&D support system

Supporting research with the latest in technology and equipment

たばこ中央研究所は、同じ青葉台にある各研究所の分析センターとしての役割もになっています。そのために、核磁気共鳴装置、質量分析装置、GC-MS、電子顕微鏡、X線マイクロアナライザー付電子顕微鏡、X線光電子分光分析計、X線回折分析装置、プロテイン・シーケンサー、DNAシンセサイザー、ペプチド・シンセサイザーなどを使用する分析要請に応えるとともに、各種機器分析法、葉たばこや香料等の微量分析法の開発をおこなっています。

また研究開発をめぐる各種情報を、コンピュータを利用して効率的に収集・処理・活用するための研究情報システムも、たばこ中央研究所が中心になって開発しています。このシステムは、所内ネットワークの構築および分析機器とコンピュータとの連動化を目標とし、所内化合物データベース、実験データ解析、図書・研究報告管理、報告書作成などの機能を含んでいます。なお、外部商用データベースを利用するための環境も整備されています。

TSRL serves as a lab-center for analysis for other research facilities, as well as working on the development of instrumental analysis and microanalysis techniques useful for measuring microamounts of chemical components in tobacco leaves and smoke.

A computer-based information system capable of efficiently storing and processing the important data resulting from our R&D work has been put into operation at TSRL.



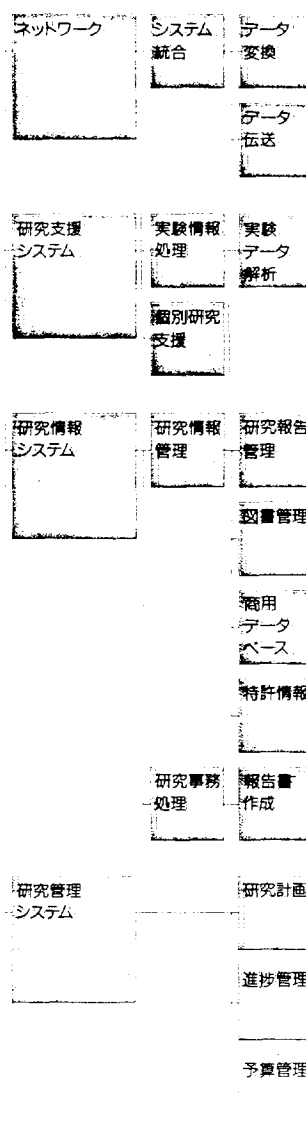
① NMR
② 質量分析装置
③ コンピュータ室



- ① NMR
- ② Mass spectrometer
- ③ Computer room

コンピュータシステム図
Diagram of computer system

研究情報
システム
(JTRIS):



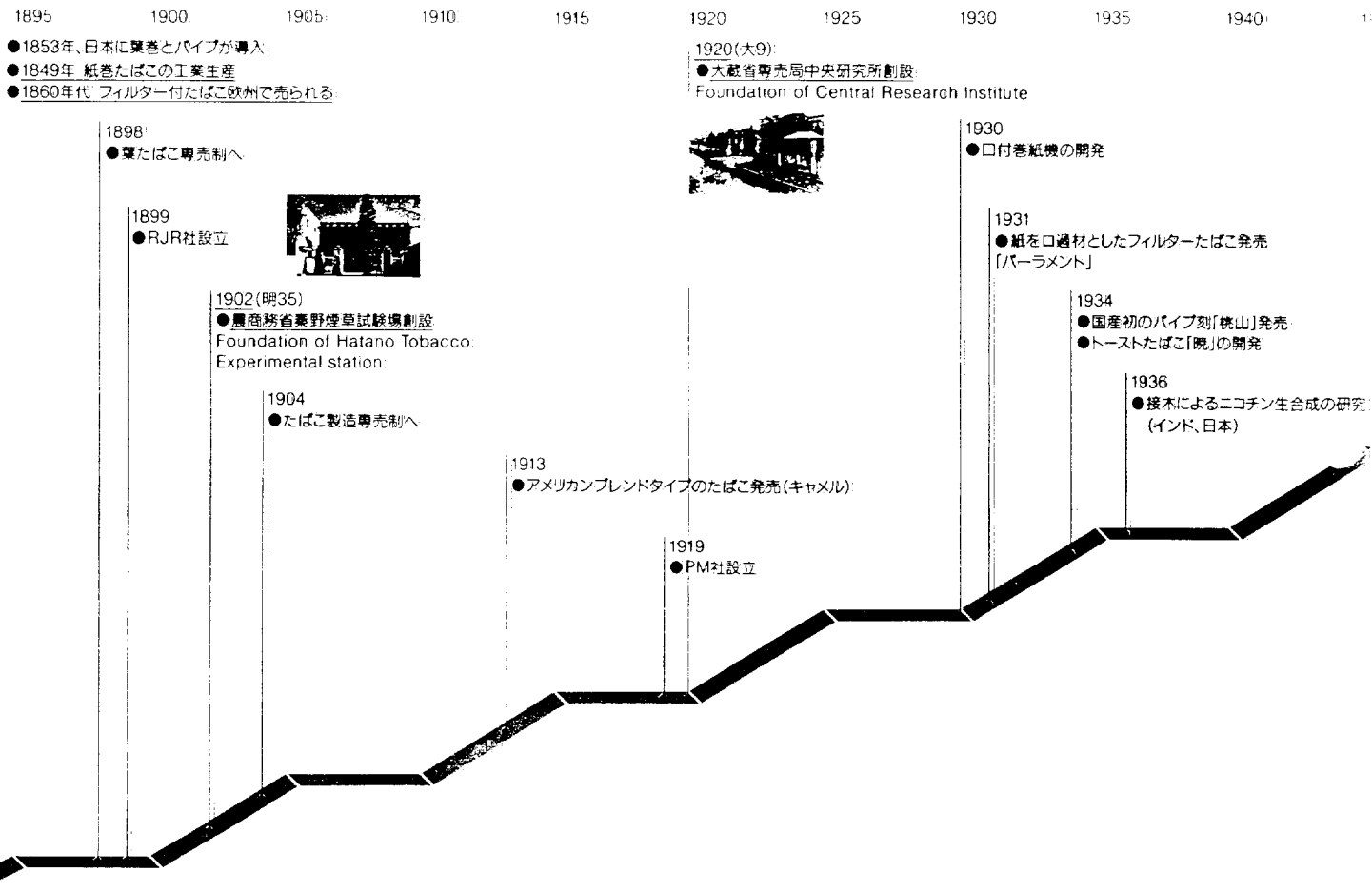
たばこをめぐる技術とたばこ中央研究所のあゆみ

A historical perspective on tobacco technology and ISEI

たばこは500年におよぶ歴史のなかで、幾多の変遷を経てきました。なかでも葉巻、パイプ、刻みなどの伝統的喫煙形態からシガレットに脱皮したのが、最大のイノベーションと言えるでしょう。シガレットにおいては、巻紙の工業化とボンザック型巻上機の開発が初期の成果でした。さらに香料の使用とバーレー葉のトースト処理を組み合わせ

た安価なアメリカンブレンドの創製は、本国たばこ産業の隆盛をもたらすことになります。第二次世界大戦後は消費者の嗜好に対応して、フィルターの開発・導入から、巻紙・チップペーパーへの微細な開孔技術を駆使した低タール革命へと続き、技術革新の大きな潮流をつくっています。

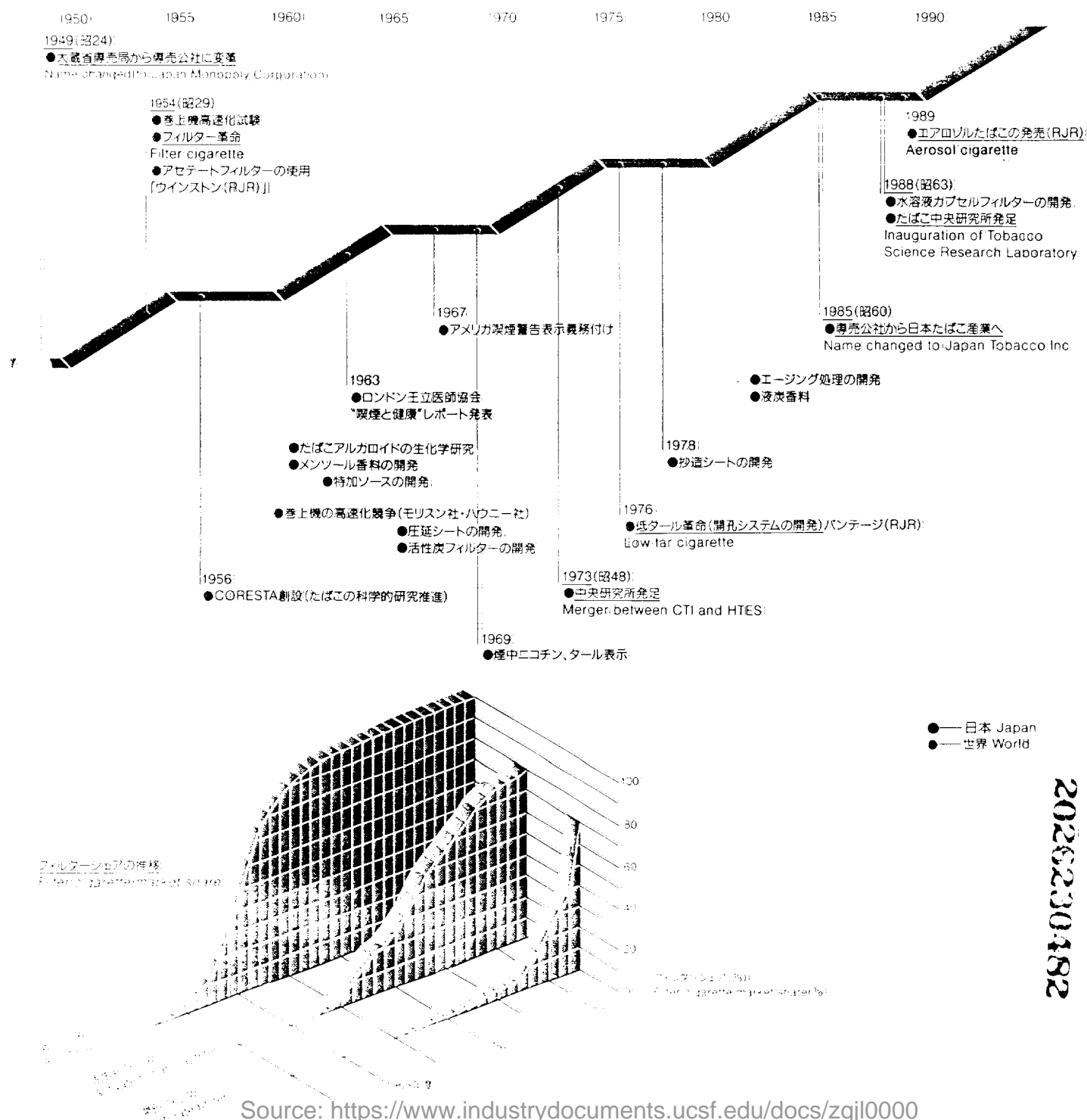
年表 Chronology



2026230481

the cigarette, itself the biggest innovation in tobacco history, was further popularized by the mass production of wrappers and the Bonsack wrapping machine, followed by the low-price American cigarette made possible by the use of aromatic essences and toasted

Buñey tobacco leaves. In the postwar period, the relationship between smoking and health resulted in a technological race to create low-tar cigarettes through use of filters and other methods.



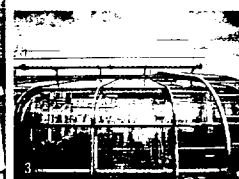
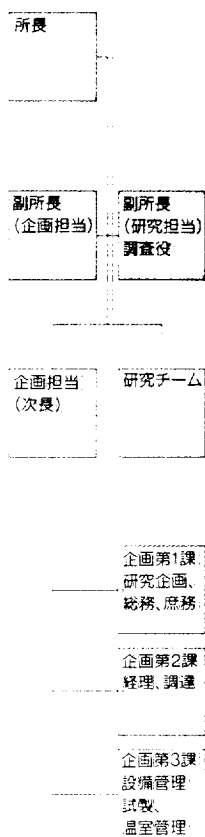
2026230482

研究をサポートする各種施設

Support services for other research facilities

たばこ中央研究所は、青葉台にある各研究所の基幹として、研究設備や福利厚生設備の管理、保守・保守などを通して、研究活動をトータルにサポートしています。

たばこ中央研究所組織図
System of organization



- 図書室
- 研修棟
- 温室



- Library
- Recreational facilities
- Greenhouse

As the central institute for all of JT's research facilities, TSRL is responsible for supporting research activities through the management and maintenance of research facilities and employee welfare facilities.

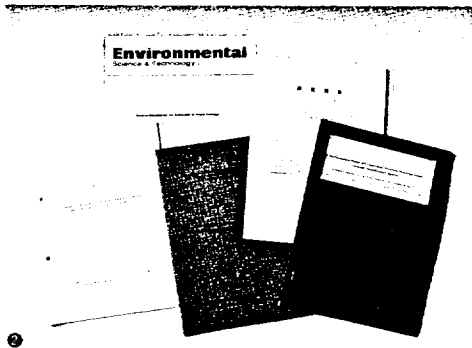
2025030493

国際的な研究交流を展開 *International research exchange*

たばこ中央研究所では、国内会議の主催・参加はもちろん、国際会議など、海外との研究交流も積極的に展開しています。常に世界の科学動向の最先端を鋭敏にキャッチし、リードし続ける努力をおこなっています。国際的に権威のある学会誌、雑誌などへの研究論文の発表も盛んにおこなわれています。これらの成果が、新しいたばこ文化の創造へ向け結集されていきます。



① 国際会議 (中国)
② 数々の発表論文

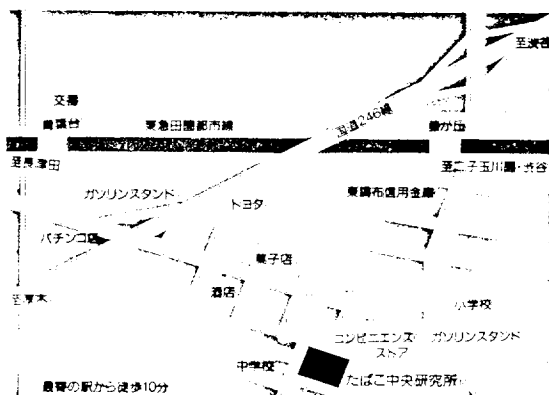


① International conference in session (China);
② Publications.

TSRL will actively endeavor to host and participate in international research exchanges at home and abroad, taking care to be up to date with the latest information and remain at the forefront of this important industry.

日本たばこ産業株式会社
たばこ中央研究所
横浜市緑区梅が丘6番2 〒227
Telephone : 045-973-5611
Facsimile : 045-973-6781

JAPAN TOBACCO INC.
TOBACCO SCIENCE RESEARCH LABORATORY
6-2, Umegaoka, Midori-ku, Yokohama, Kanagawa 227 JAPAN
Telephone : (045)973-5611
Facsimile : (045)973-6781



JT

LSRL

生命——その未知なる世界を探究する
Exploring New Science Fields of Life

2026230486

日本たばこ産業株式会社
生命科学研究所
JAPAN TOBACCO INC.
Life Science Research Laboratory

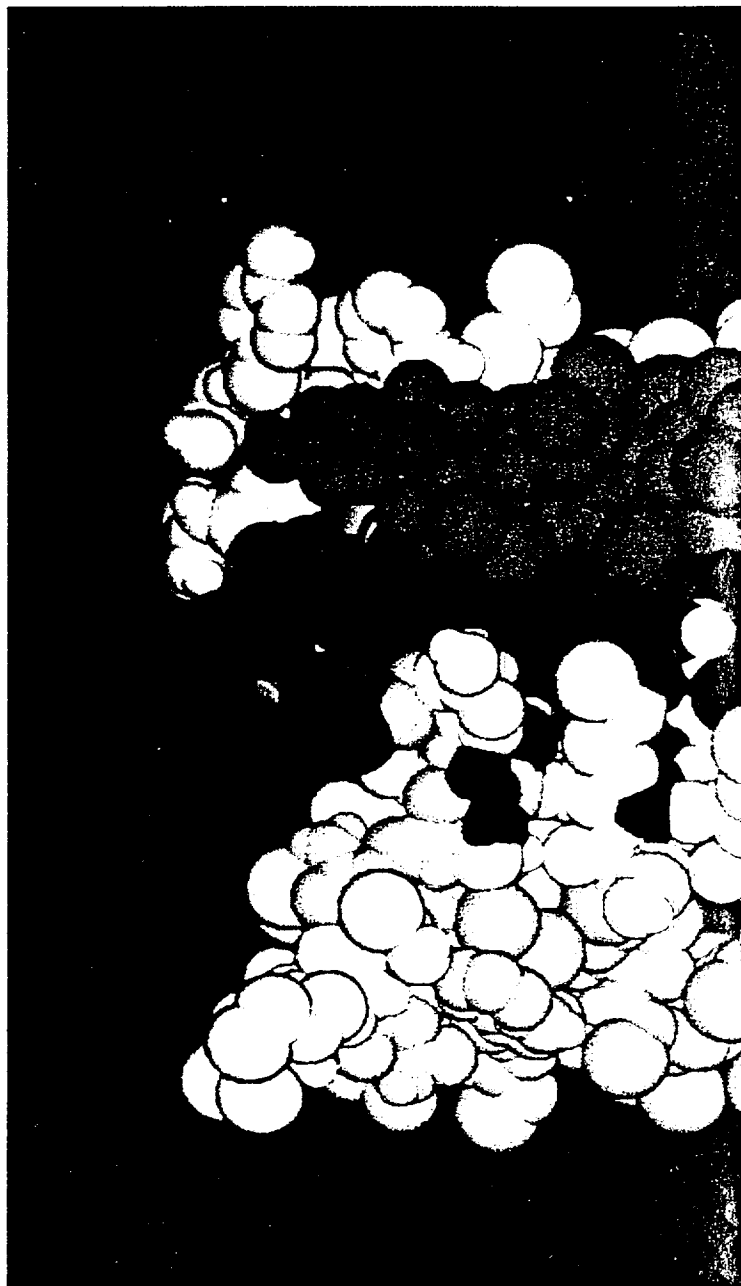
生体のかぎりない機能を求めて

Learning from the miraculous living organism

数十億年の進化の過程を経た生体や生命は、認識、応答をはじめとした、精緻な様々の機能をもっています。

生命科学研究所は、無限の可能性を秘めたこの生体や生命の機能の研究を通して、日本たばこの多様な事業のブレイクスルーと新しい事業シーズの探索をおこなっています。

Life, through billions of years of evolution, has acquired diverse and incredibly sophisticated recognition and response abilities. Investigating the infinite functions inherent in natural life, Life Science Research Laboratory is discovering breakthroughs useful to various enterprises of Japan Tobacco Inc., and planting seeds for further growth.

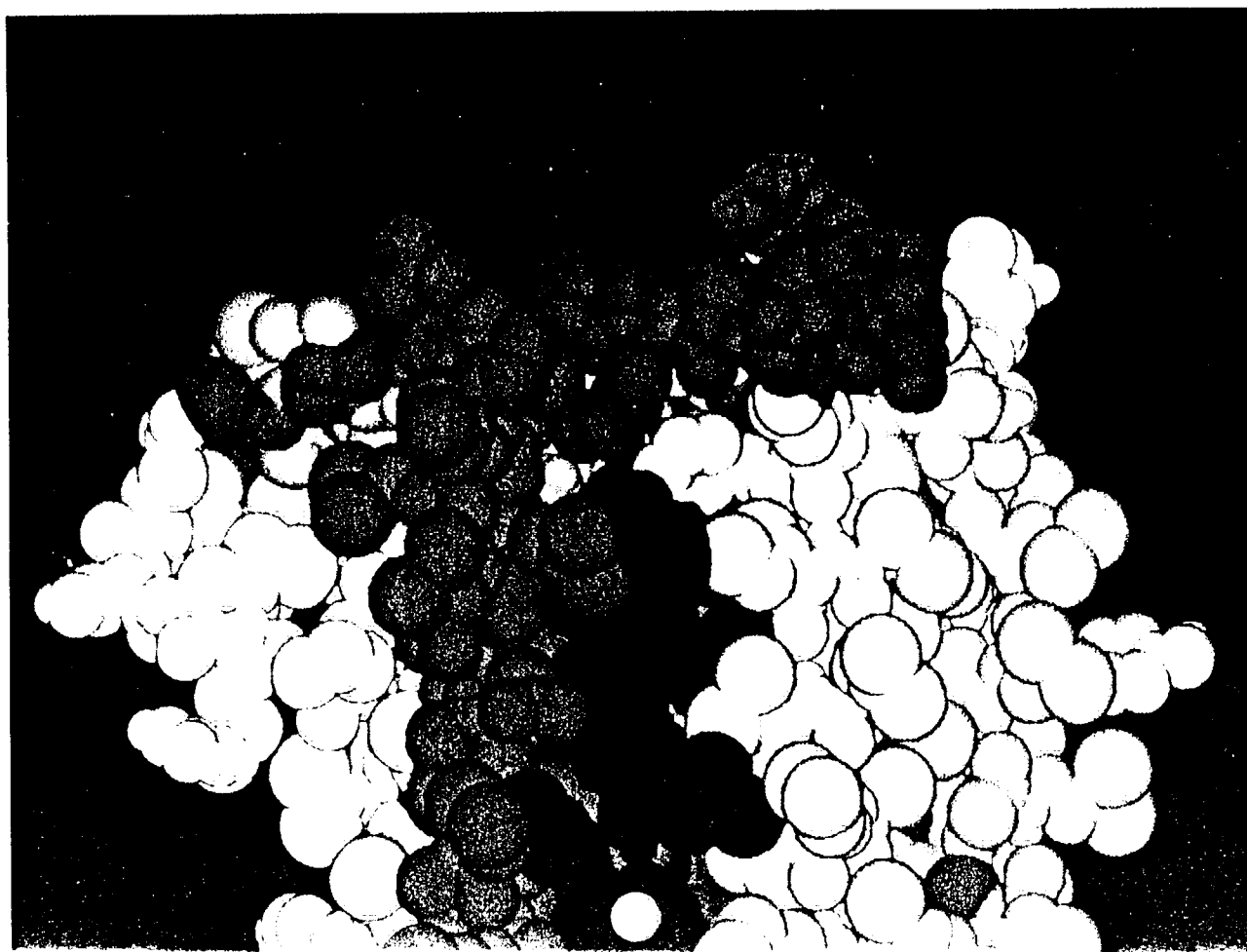


2026230487

2026230488

©バクテリオロドプシン
(光受容タンパク質)の
推定構造

©Proposed structure
of bacteriorhodopsin



認識するウイルス

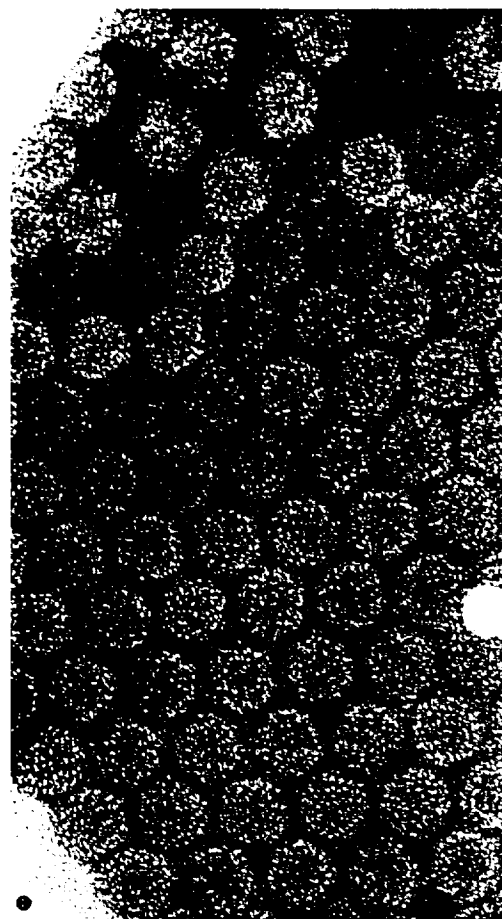
植物ウイルス研究からのアプローチ

Viruses and Genes

植物ウイルスRNAは自己複製能をもつ遺伝子です。そこでウイルス研究は必然的に遺伝子に関する研究へと発展することになります。すでにキュウリモザイクウイルス(CMV)に寄生するサテライトRNAのcDNAをタバコの核遺伝子に組み込むことにより、CMV抵抗性タバコの作出に成功しました。

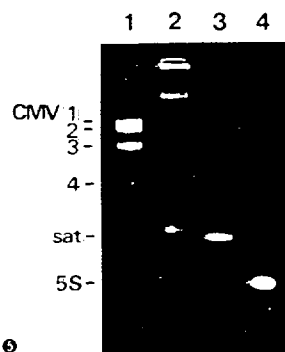
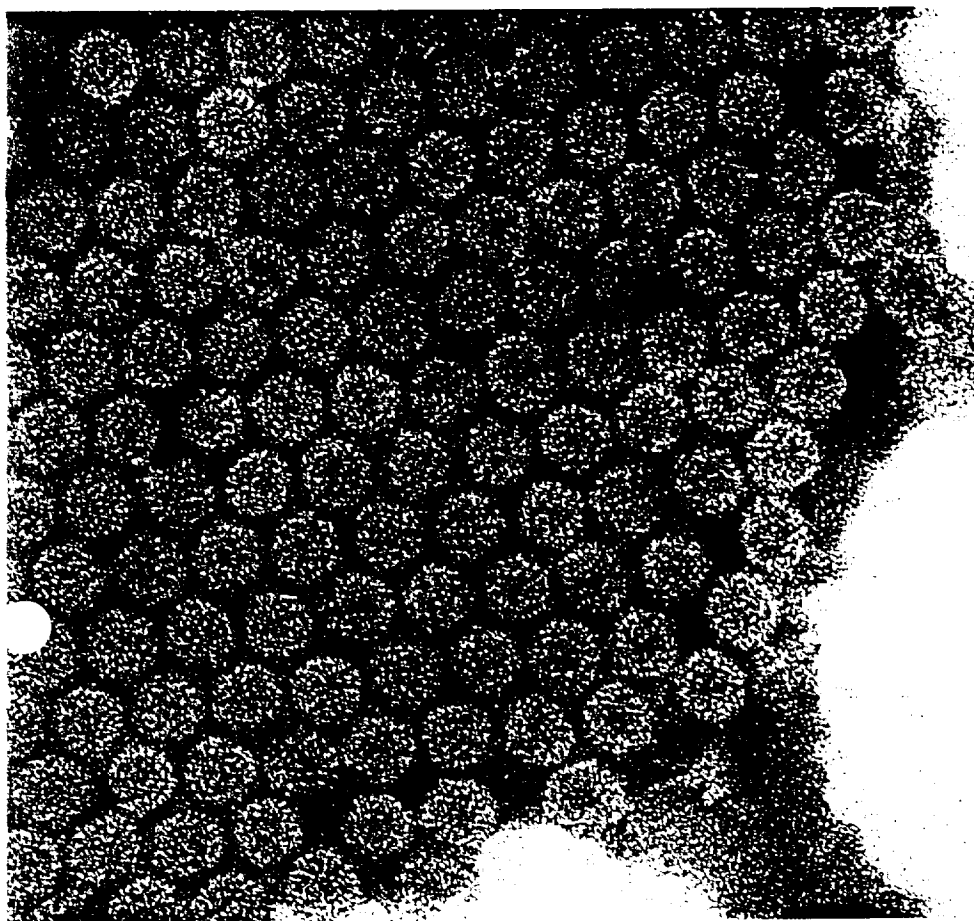
あるウイルスが特定の宿主だけを特異的に認識し、増殖していくという一連のメカニズムを探ることがこれからの大きな研究対象です。

Most plant viruses have self-replicating RNA genes. Therefore, our viral research inevitably leads to molecular biology. We have already succeeded in producing transgenic tobacco plants resistant to cucumber mosaic virus (CMV) by introducing cDNA of CMV satellite RNA. Elucidating the mechanisms of how a virus recognizes its own hosts and multiplies is an exciting challenge.



- ① キュウリモザイクウイルスの電子顕微鏡写真
- ② タバコモザイクウイルスの電子顕微鏡写真
- ③ サテライトRNAによるキュウリモザイクウイルス感染メロンの病徴軽減
- 左: ウイルス感染
- 中央: ウイルスー
- サテライトRNA感染
- 右: 健全
- ④ DNA塩基配列決定装置
- ⑤ RNAのアガロースゲル電気泳動

2026230489



① Electron micrograph of cucumber mosaic virus.

② Electron micrograph of tobacco mosaic virus.

③ Symptom attenuation on cucumber mosaic virus infected melon plants by satellite RNA: left: Infected with virus; center: infected with virus and satellite RNA; right: Healthy control.

④ DNA sequencer.

⑤ Agarose gel electrophoresis of RNA.

2026230490

細胞分化、ガン化とタンパク質

細胞分化、タンパク質研究からのアプローチ

Proteins, Cell Differentiation and Cancer

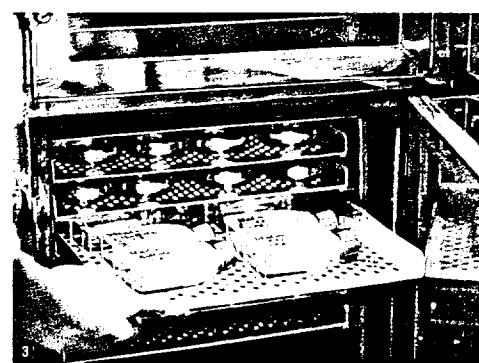
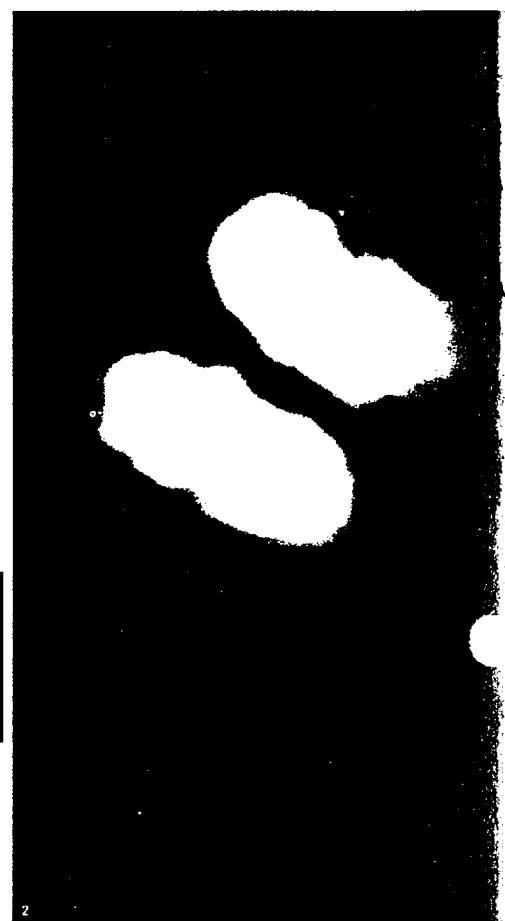
発ガン機構と細胞分化機構の解明は、細胞・タンパク質研究にとっての最大の関心事です。これらに關与するタンパク質について、遺伝子組換え技術、X線結晶解析技術を駆使して構造を明らかにするとともに、ガン化、細胞分化における機能を解明します。

また遺伝子の構造と機能の面に対しても、アプローチしていきます。

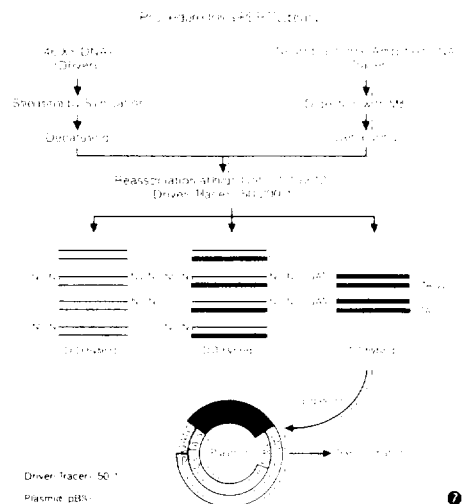
One of our interesting targets is the elucidation of cell differentiation and carcinogenesis mechanisms. Learning more about the structure and function of proteins with the aid of genetic engineering technology and X-ray crystallographic analysis will help us to understand the differentiation and carcinogenesis processes step by step. We are also pursuing an understanding of the structure and function of various genes.



- 核顆粒と中間径繊維
(ハムスター-BHK21細胞
間期)
- 核の顆粒状物質と染色体
(ヒラ細胞 分裂期)
- 赤: 中間径繊維タンパク質に
対するモノクローナル抗体
により認識された核の
顆粒状物質
青: 染色体
- 炭酸ガスインキュベーター
- 染色体標本
- チャイニーズハムスター
V79細胞の染色体
- リポポリサッカライド
(LPS)処理により:
マクロファージ様に分化した
マウスJ774-A1細胞
- ヒト神経芽細胞腫より
増殖ガン遺伝子の分離



2026230491



- Nuclear granules:
and intermediate
filaments (Hamster
BHK21 cell, interphase).

- Nuclear granules and chromosomes (HeLa cell mitotic phase)

- red: Nuclear granules
recognized by a
monoclonal antibody
to intermediate
filament protein
blue: Chromosomes
stained by Hoechst
33258

- 3 CO₂ incubator
- 4 Chromosome: preparation
- 5 Chromosomes of a Chinese hamster V79 cell
- 6 Mouse J774A1 cells differentiated into macrophage-like cells by LPS-treatment
- 7 Procedure for a PERT library



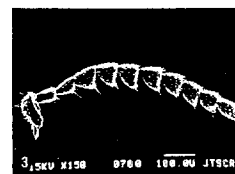
フェロモンの応答

昆虫フェロモン研究からのアプローチ

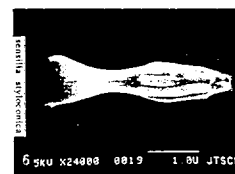
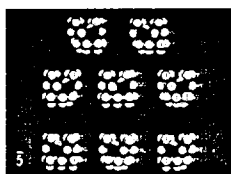
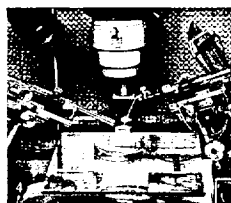
Insects and Pheromones

タバコシバンムシやワモンゴキブリなどの昆虫では、雄は雌が分泌する性フェロモンに誘引されます。

空気中に数ある化合物の中から、同種の雌の分泌するフェロモンだけを特異的に認識し、応答するメカニズムについて、計算化学、電気生理学などを応用し、学際的な研究をすすめています。



In many insect species, including the common cockroach and cigarette beetle, the male is attracted by a pheromone secreted by the female. We are using state of the art computational chemistry and neurophysiology in an interdisciplinary effort to elucidate the mechanisms of how the receptor in the male antenna can recognize only the female's pheromone molecule among many other airborne chemicals.



- ① 昆虫の神経伝達系
- ② 昆虫の脳 (ゴキブリ)
- ③ 昆虫の触角 (タバコシバンムシ)
- ④ 昆虫触角のフェロモン認識反応分析装置 (エレクトロアンテノグラフ)
- ⑤ セリコルエン (タバコシバンムシの性フェロモン) の立体構造
- ⑥ フェロモン感受毛 (タバコシバンムシ)

- ① Insect neurosystem
- ② Insect brain (cockroach)
- ③ Insect antenna (cigarette beetle)
- ④ Electroantennograph
- ⑤ Computer graphics of serricornin, the sex pheromone of cigarette beetle and its analogues.
- ⑥ Pheromone sensillum (cigarette beetle)

2026230493

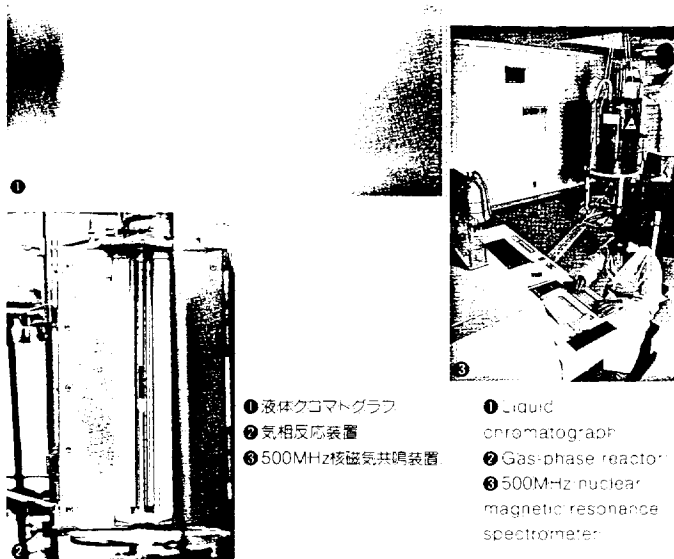
Biomimetic Chemistry

有機金属化学や触媒化学を中心に有機化学と無機化学の融合が図られ、官能基の変換、炭素-炭素結合による骨格構成が比較的容易になってきています。しかし、試験管内での不斉合成、位置選択性、立体選択性などの反応は、生体内でおこなわれている生合成反応にはまだまだ遠く及びません。

生合成反応を模倣し、様々な有用化合物を効率よく合成する反応を見だし、その有用性を検証することは、これからの大きなテーマです。

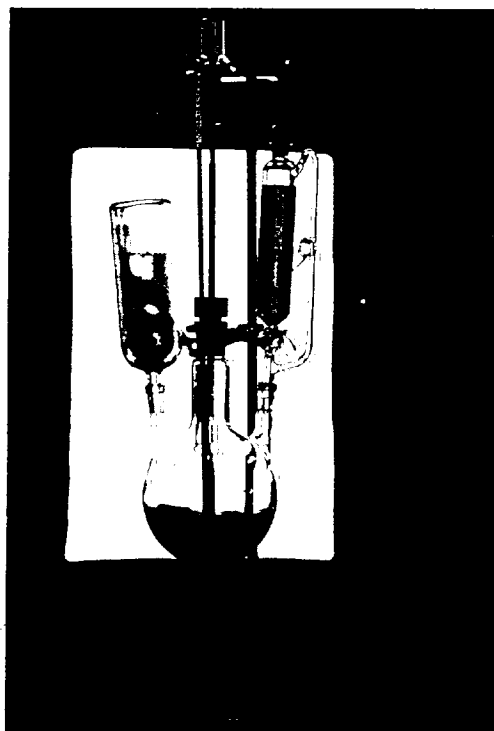


By fusing inorganic with organic chemistry based around organometallic and catalytic chemistry, the transformation of the functional groups and the construction of the carbon skeletons should be relatively easy. Nevertheless, our laboratory effects are still crude compared to what occurs in nature. A major aim of this work is to discover the processes whereby useful compounds may be efficiently produced by mimicking natural biosynthetic processes.



生命科学研究所の概要

Life Science Research Laboratory A Summary



生命科学の研究は限りない発展性を秘めています。人間のより良い生活文化の創造を目指し、私たちは生命の認識機構の解明を第一歩として、着実な前進を続けていきたいと考えます。

Life science research is brimming with potential. In order to improve the quality of our lives, we hope to unlock the secrets of biological recognition mechanisms as a first step in our continued efforts to realize this exciting potential.

生命科学の研究

Outline of Life Science Research

動植物の
ホメオスタシスの
制御方法

Homeostasis

動植物へ
新しい機能の導入

Transgenic
animals and
plants

ホメオスタシスの
制御物質

Controlling
substances of
homeostasis

認識制御物質

Controlling
substances of
recognition

高度情報処理技術の

基礎となる
アルゴリズム・素子

Algorithms and
elements;
sophisticated
data processing
is based on

高性能センサ

High
performance
sensors

機能性高分子集団

Functional high
molecules

新触媒・人工酵素

New catalysts
and artificial
enzymes

生命科学の研究

Outline of life science research

生命の認識機構の解明

To understand
the machanisms
for biological
recognition

ウイルスの研究

Virology
research

蛋白質の研究

Protein research

生物活性分子の研究

Bioactive
molecules

細胞分化の研究

Cell
differentiation
research

昆虫の認識機構の
研究

Insect
recognition-
mechanism
research

2026230495

研究開発組織
Organization
of R&D

社長
President and Chief
Executive Officer

医薬品事業部
Pharmaceutical
Division

薬量研究所
Pharmaceutical
Research
Laboratories

薬品調製研究所
Plant Blending and
Control Research
Laboratory

植物開発研究所
Applied Plant
Research Laboratory

食生活研究所
Food R&D Center

生産技術研究所
Engineering
Research
Laboratory

葉たばこ研究所
Leaf Tobacco
Research Laboratory

製品開発センター
Product R&D Center

たばこ中央研究所
Tobacco Science
Research Laboratory

生命科学研究所
Life Science
Research Laboratory

海水総合研究所
Sea Water Science
Research Laboratory

技術企画室
Technological
Planning Dept

特許室
Patent Dept

安全性研究所
Toxicology Research
Laboratories

施設管理
施設生理実験室
施設生理実験室
ウイルス実験室
酵素実験室
遺伝子組換え実験室
X線結晶解析所
低温実験室
有機合成実験室
塩毒実験室
動物飼育室
植物培養実験室
温室
一般実験室
居室

Main Facilities:

Cell physiology laboratory
Electrophysiology laboratory
Virology laboratory
Enzyme laboratory
Genetic engineering laboratory
X-ray crystallography laboratory
Cold room
Organic synthesis laboratory
Culture laboratory
Animal room
Plant cultivation laboratory
Greenhouse
General laboratory
Office

主要分析機器

Equipment

NMR (500, 300MHz)
FTIR
MS (LC, GC)
ESCA
電子顕微鏡 (走査型、
透過型, XMA)
Electron microscope
超遠心分離機
Ultra centrifuge
DNAシーケンサー
DNA sequencer
DNAシンセサイザー
DNA synthesizer
ペプチドシーケンサー
Peptide sequencer
ペプチドシンセサイザー
Peptide synthesizer
FPLC
30L培養槽 (4基)
Jar fermentor (30L x 4)
IRIS 4D 70G
VAX 8530 750
等

アグリ事業部
Agribusiness Division

システム・エンジニアリング
事業部
Systems Engineering
Division

原料部
Domestic Leaf
Tobacco Division

製造部
Manufacturing
Division

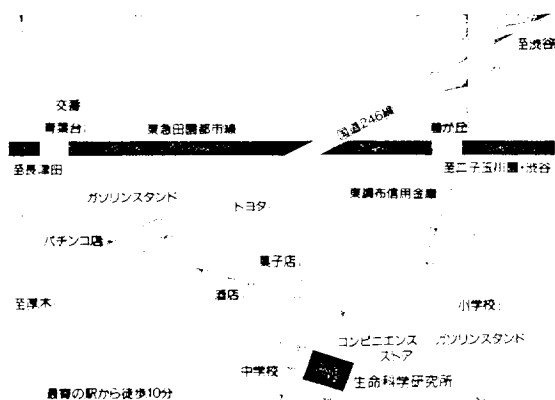
基礎技術研究所
Fundamental
Research Division

塩務事業本部
Salt Administration
Headquarters

企画部
Planning Division

日本たばこ産業株式会社
生命科学研究所
横浜市緑区梅が丘6番21 〒227
Telephone :045-972-5901
Facsimile :045-972-6205

JAPAN TOBACCO INC.
Life Science Research Laboratory
6-21, Umegaoka, Midori-ku, Yokohama, Kanagawa 227 JAPAN
Telephone : (045)972-5901
Facsimile : (045)972-6205



2026230497

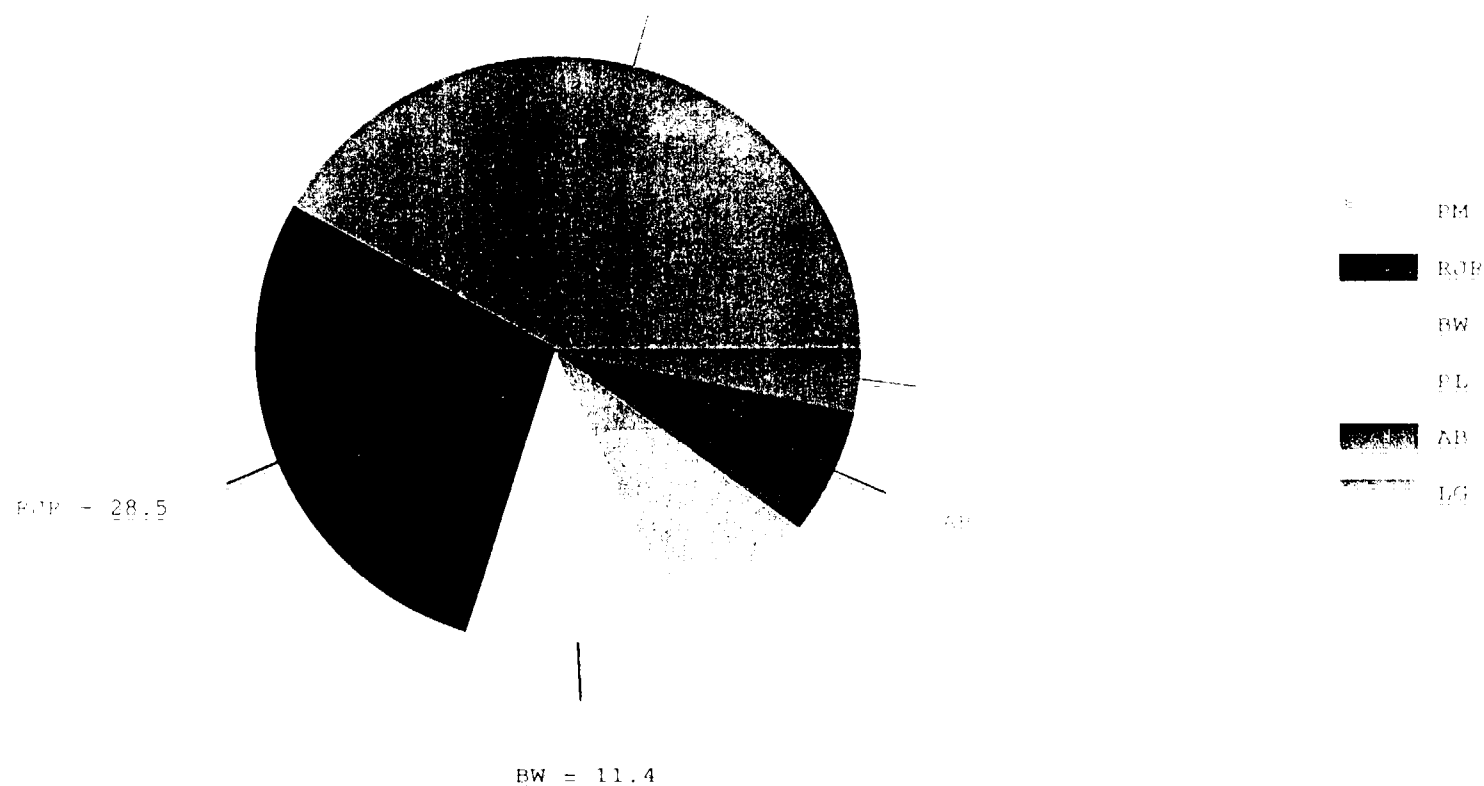
2026230498

APPENDIX J

Segmented Cigarette Market Trends

2026230499

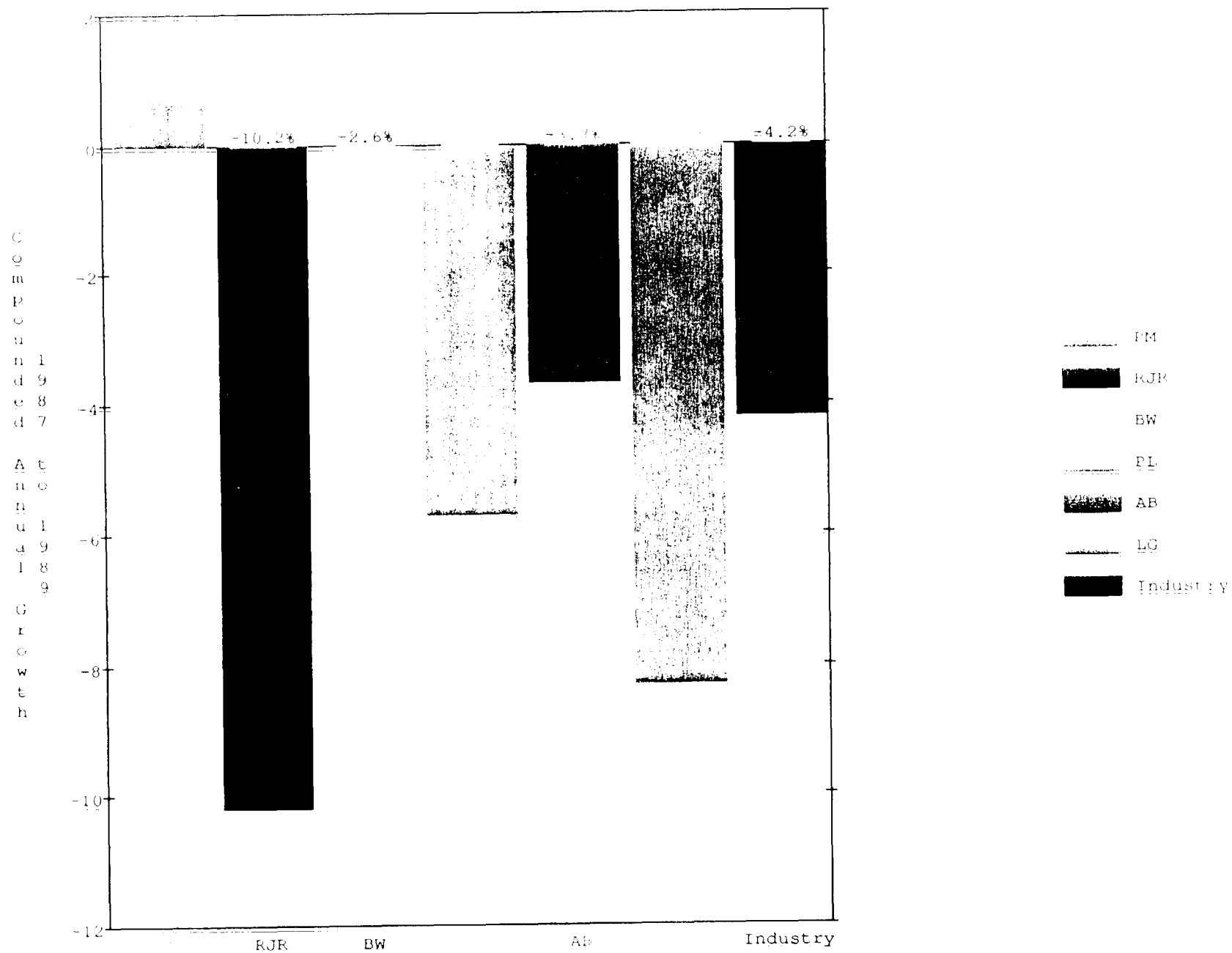
Total Domestic Market
1989 Market Share



20262230500

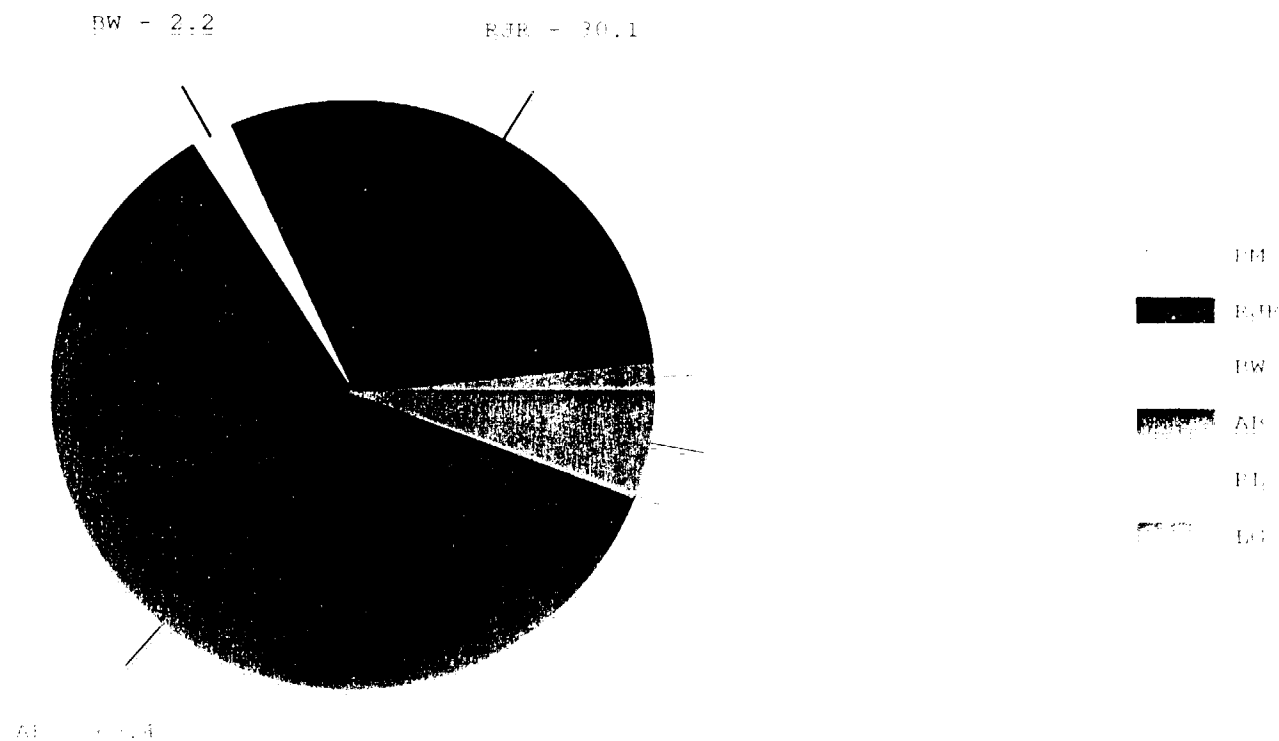
1989 Market Share
Total Volume = 523.9 Billion Units

Total Domestic Market



2026230501

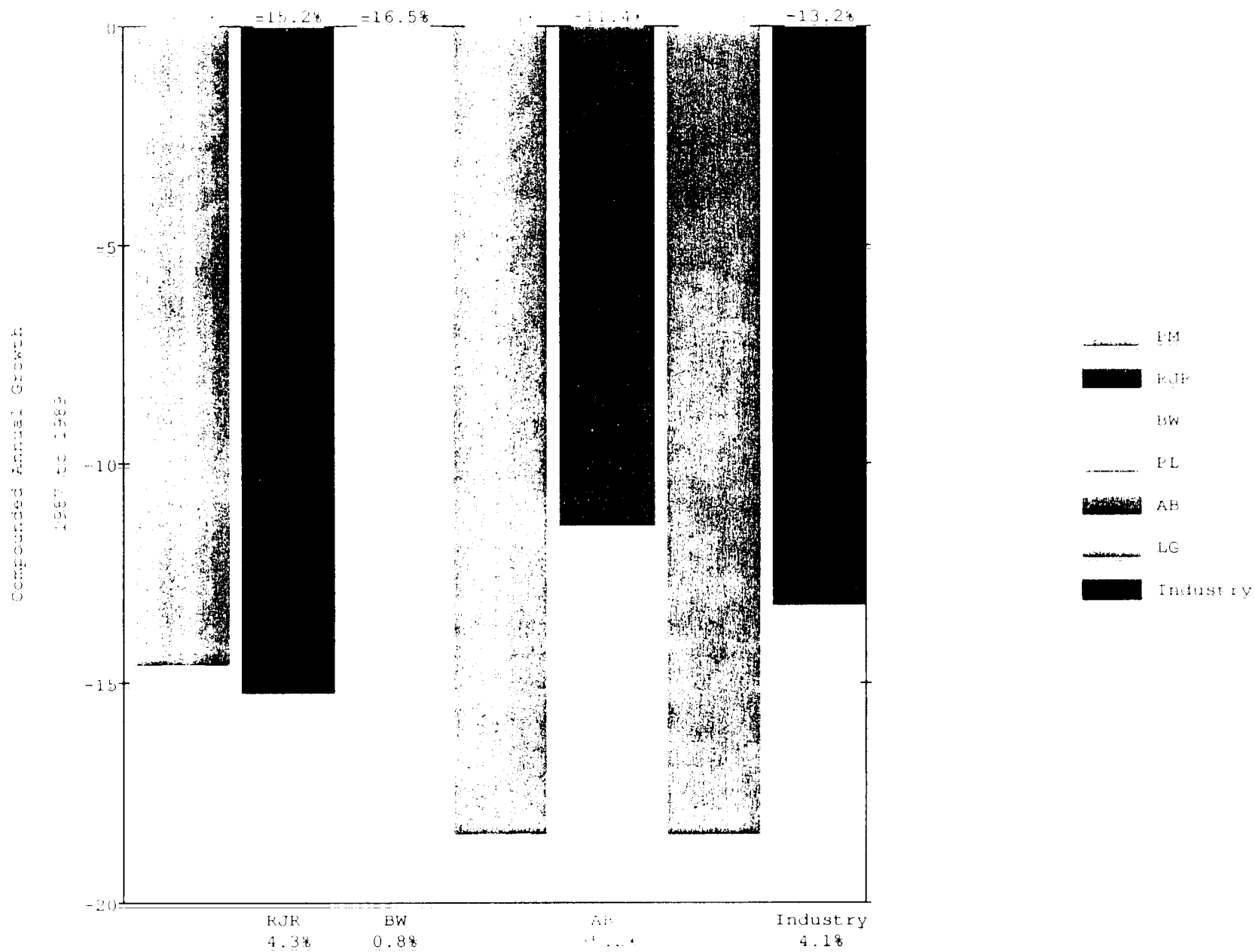
Non-Filter Segment
1989 Market Share



1989 Market Share (4.1%)
Pot. H. Volume = 21.3 Billion Units

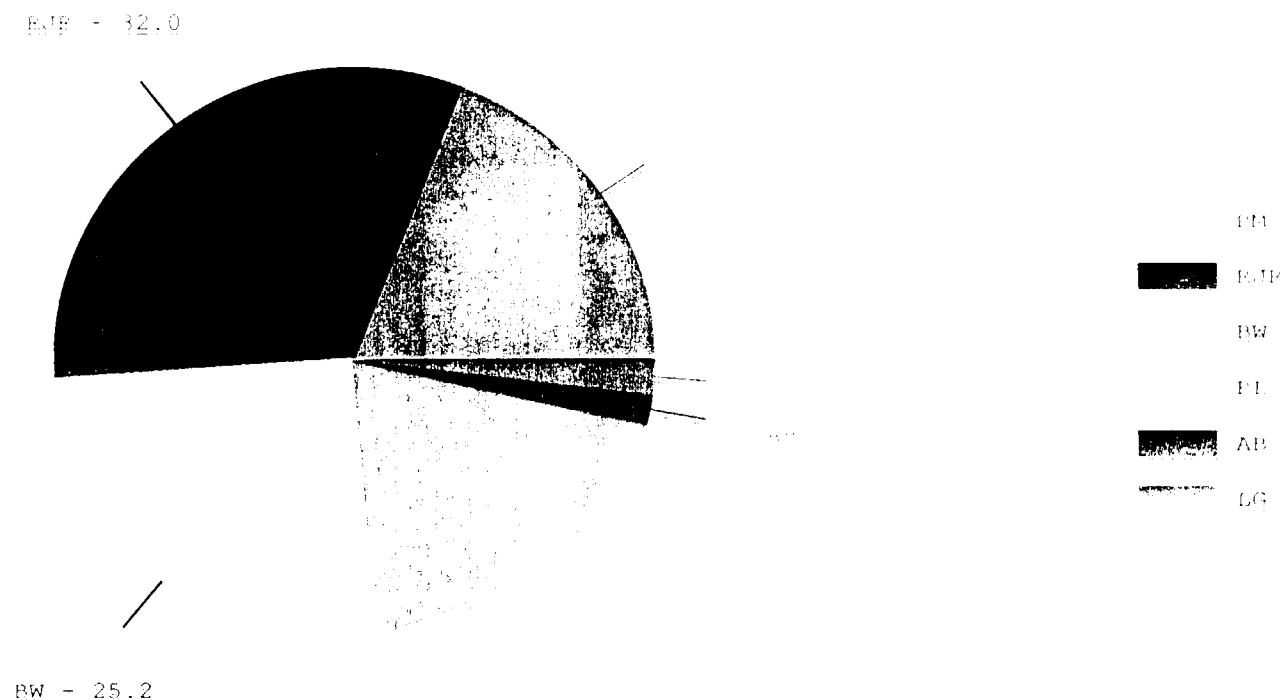
2050829202

Non-Filter Segment



* = Segment Volume / Company Volume

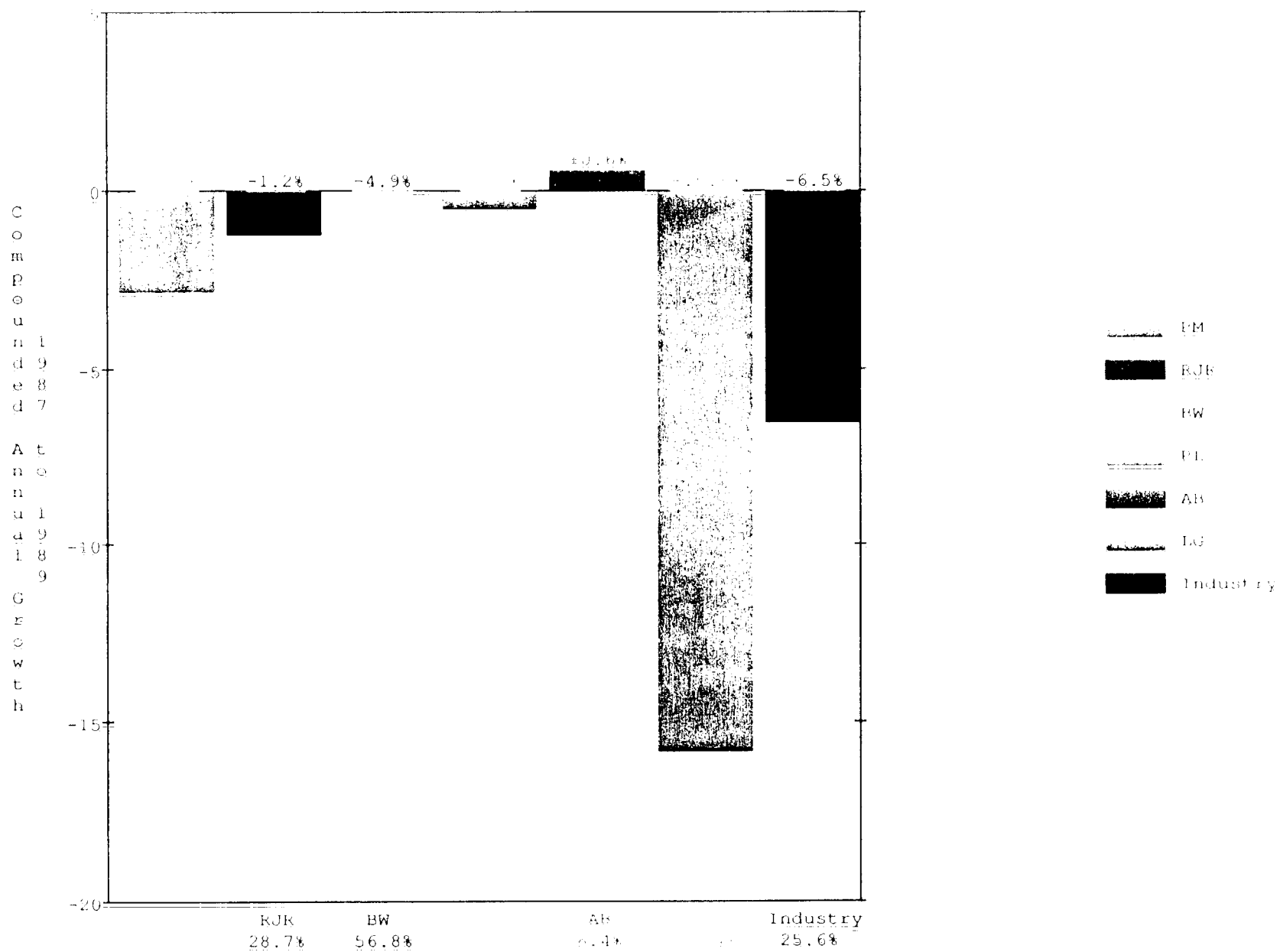
Menthol Segment
1989 Market Share



1989 Market Share (25.6%)
Total Volume = 134.0 Billion Units

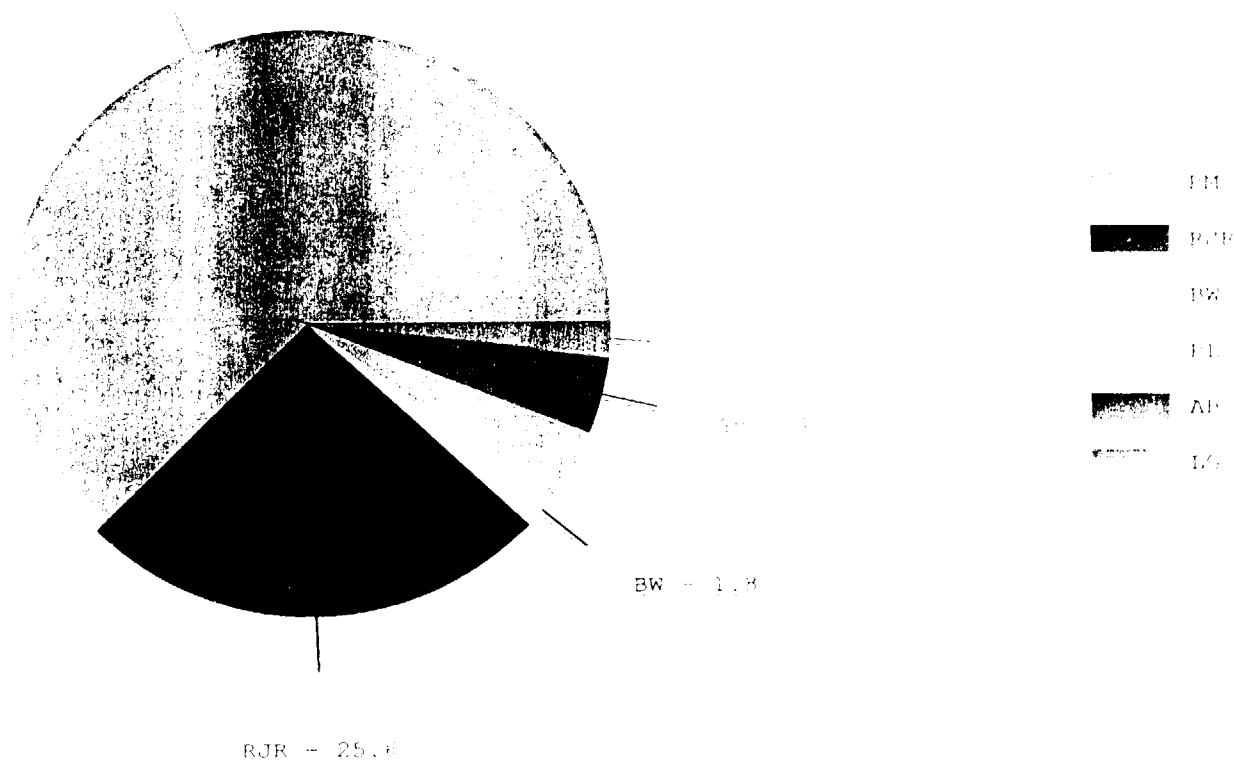
2026230504

Menthol Segment



* - Segment Volume / Company Volume

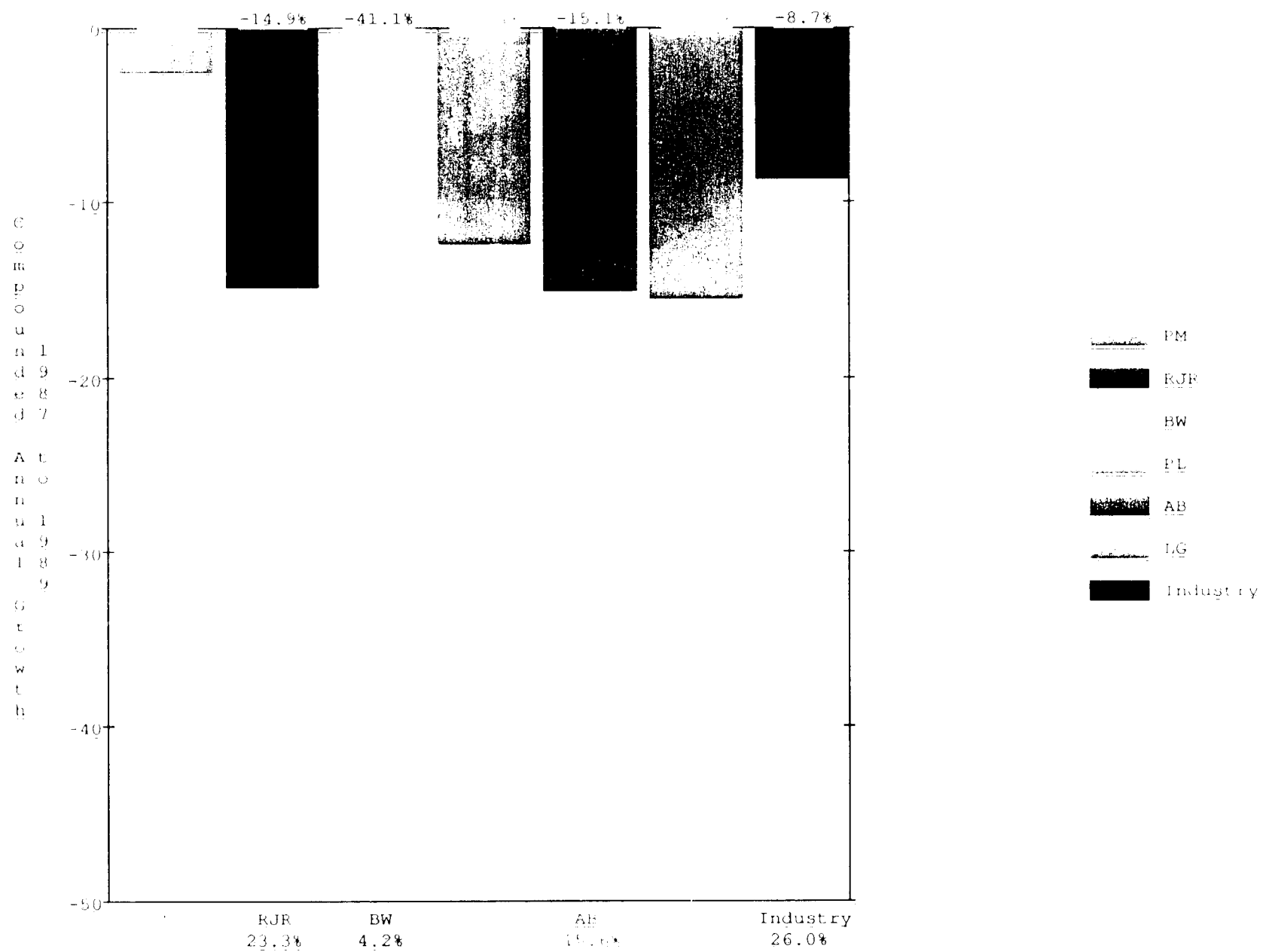
Full Flavored Filter Segment
1989 Market Share



1989 Market Share (26.0%)
Total Volume = 136.0 Billion Units

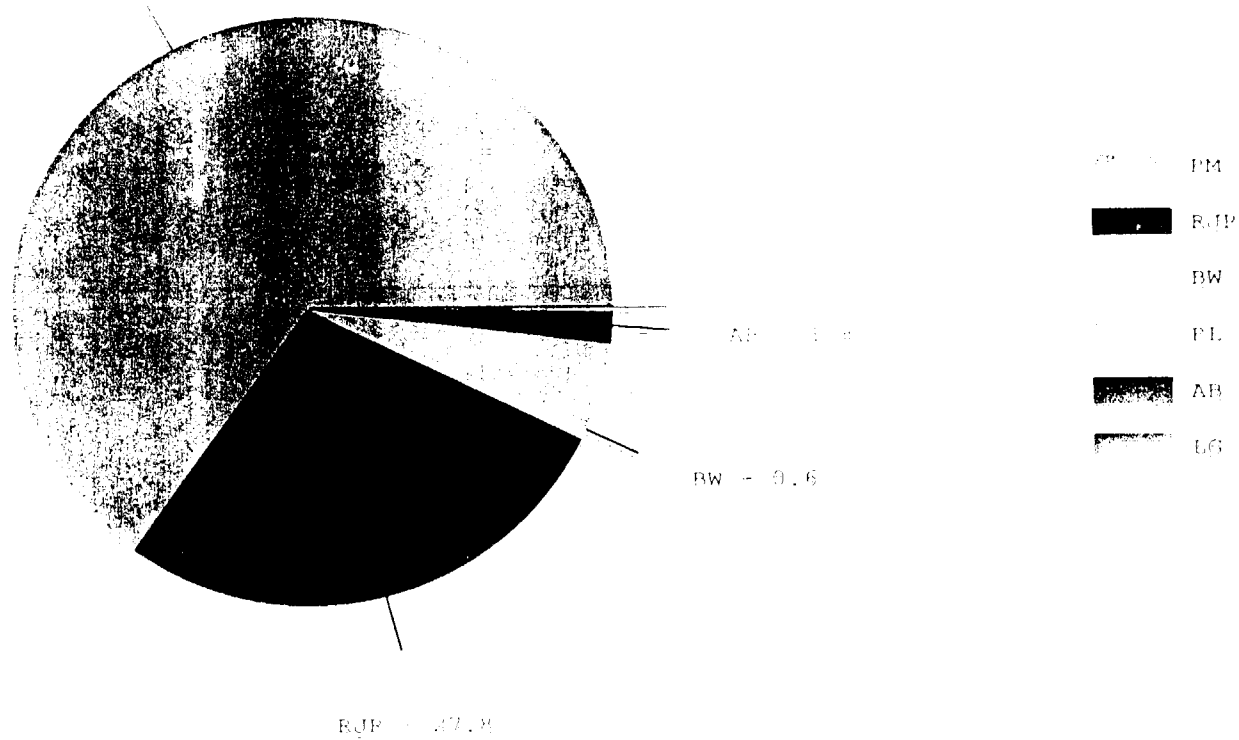
2026230506

Full Flavored Filter Segment



2026230507

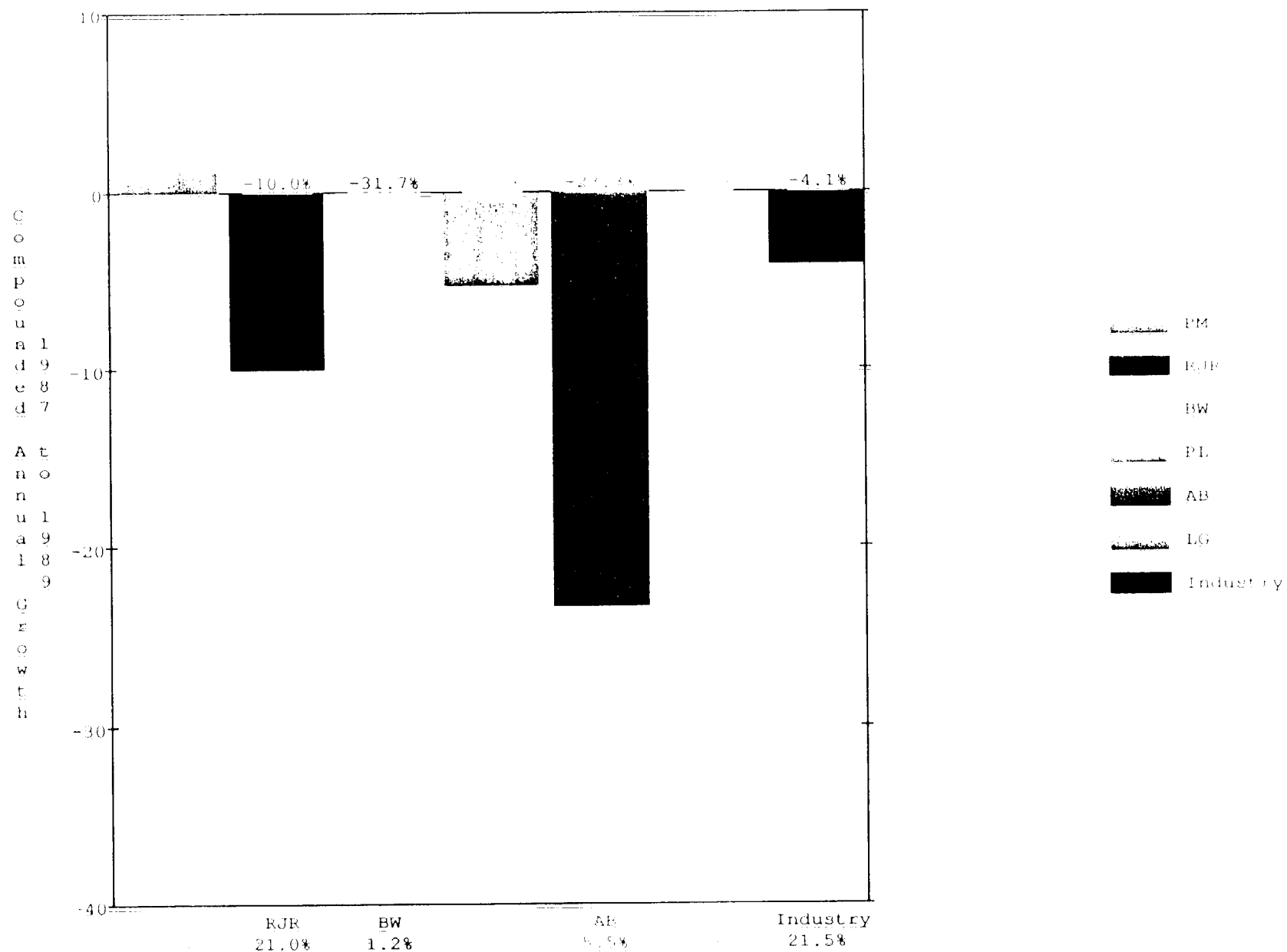
Light Filter Segment
1989 Market Share



1989 Market Share (21.5%)
Total Volume = 112.6 Billion Units

2026230508

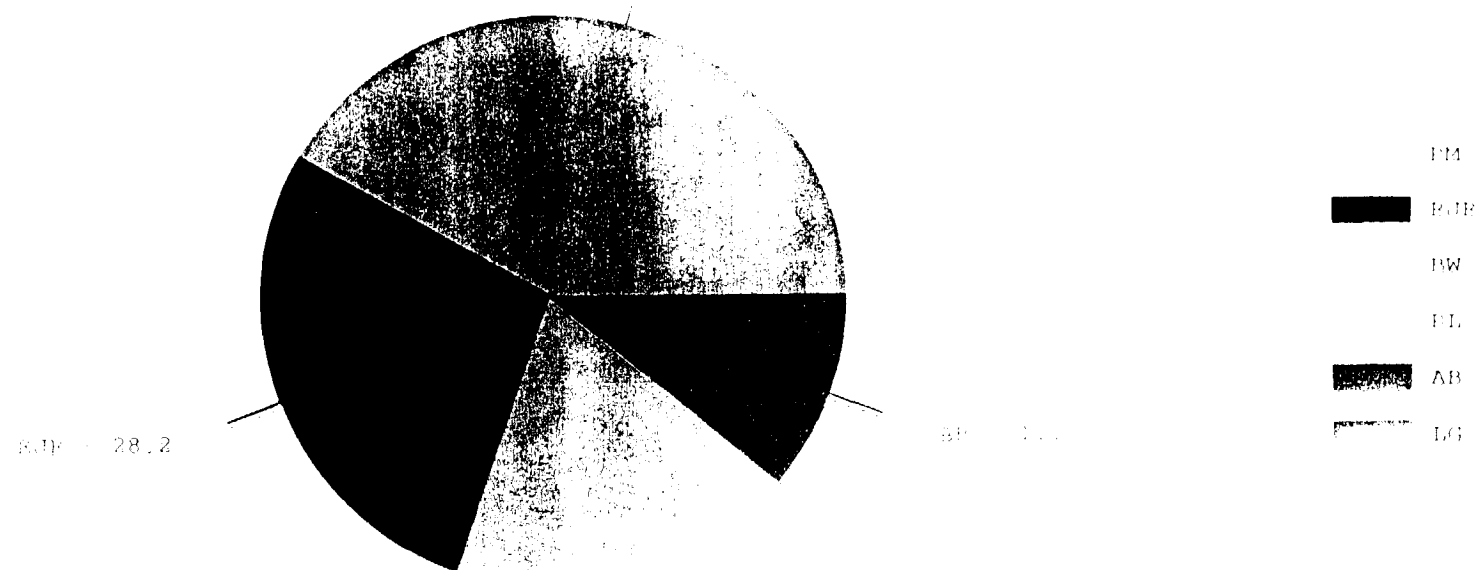
Light Filter Segment



% = Segment Volume / Company Volume

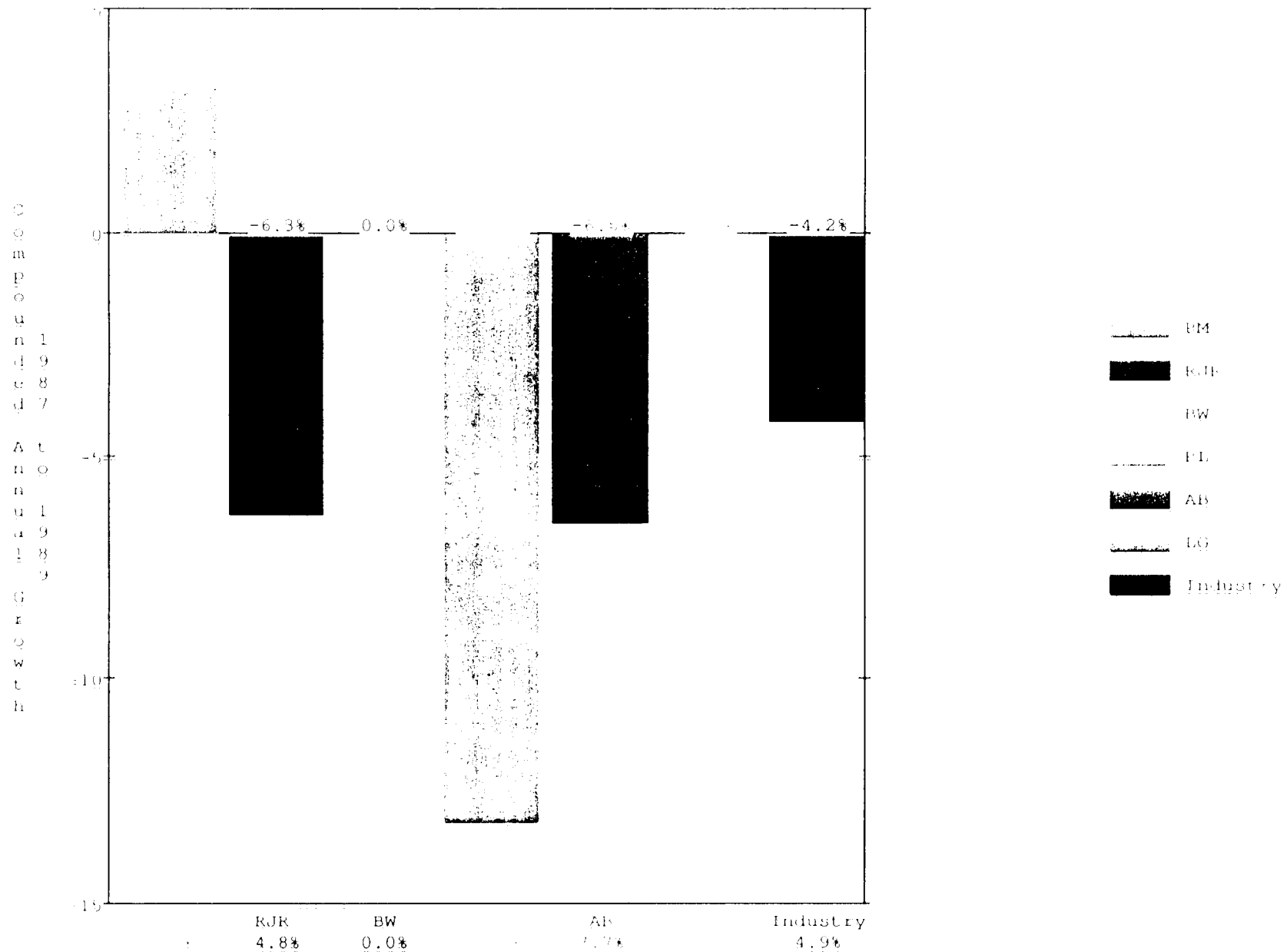
2026230509

Ultra Lights Filter Segment
1989 Market Share



2026230510

Ultra Lights Filter Segment

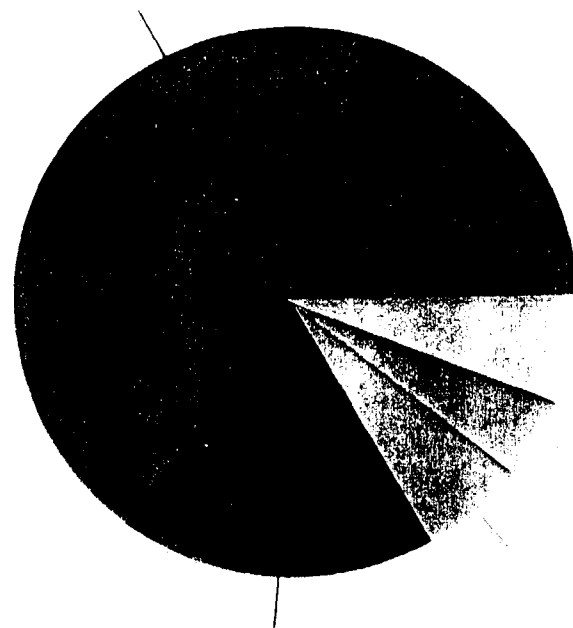


* = Segment Volume / Company Volume

2026230511

Price / Value by Type

1984 Market Share
Total Volume = 77.5 Billion Units



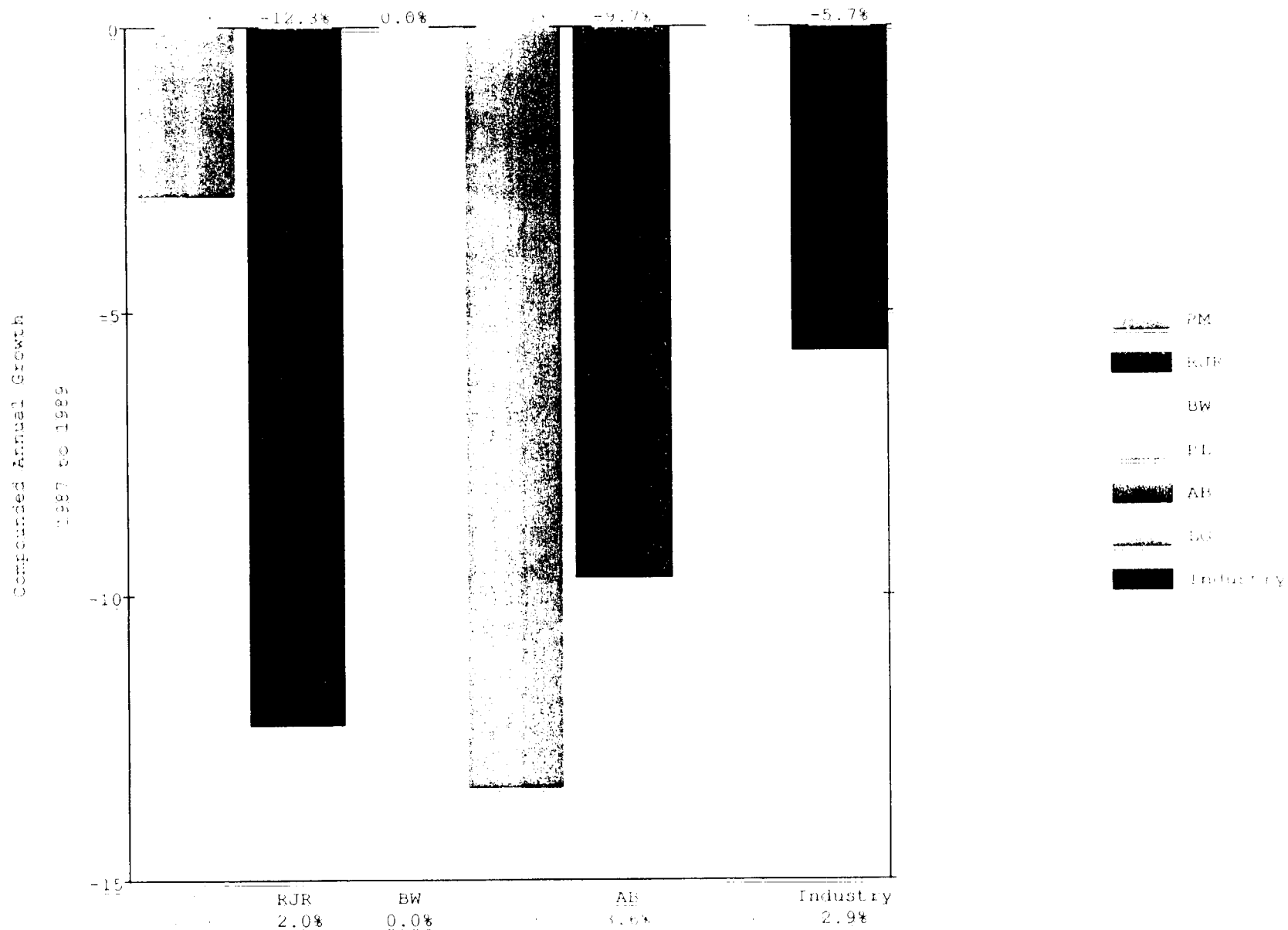
Branded Generics
Generics
Value 25's
Price Off
Sub-Generic (Third Tier)

Generics = 18.2

1984 Market Share (14.8%)
Total Volume = 77.5 Billion Units

2026230512

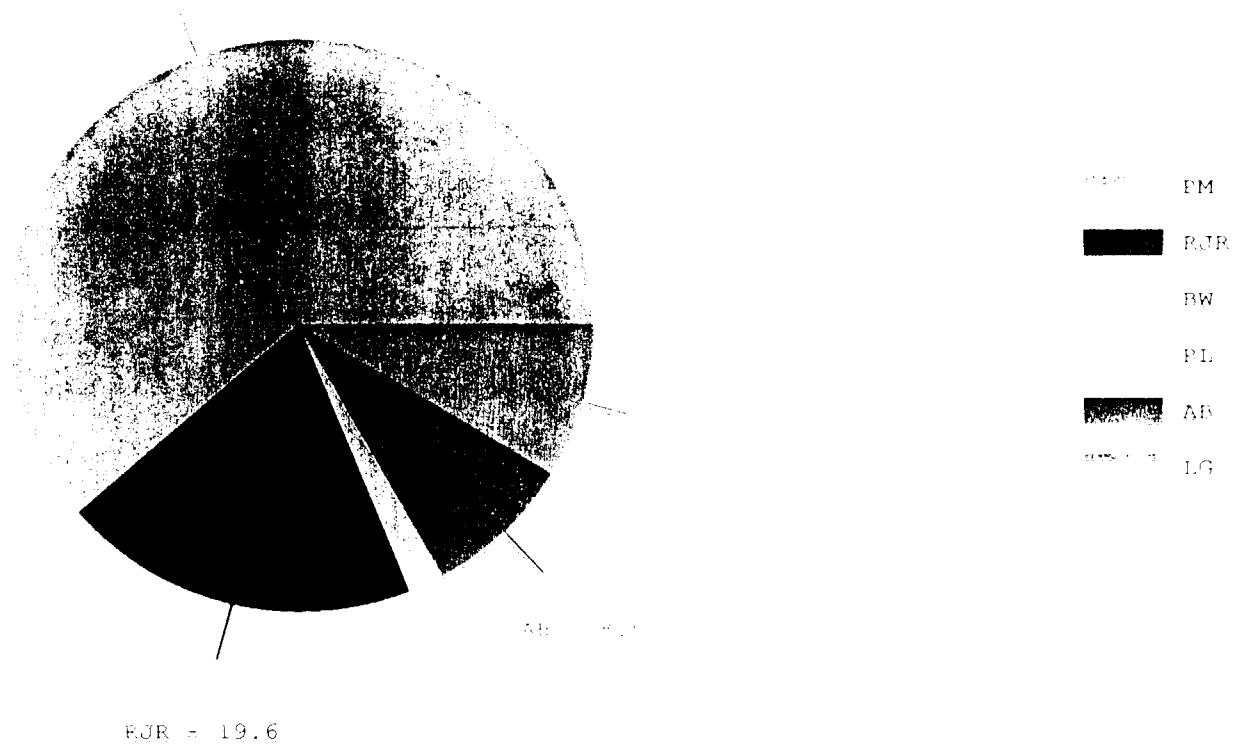
Slims / 120's Segment
1989 Market Share



Segment Volume / Company Volume

2026230513

Slims / 120's Segment
1989 Market Share



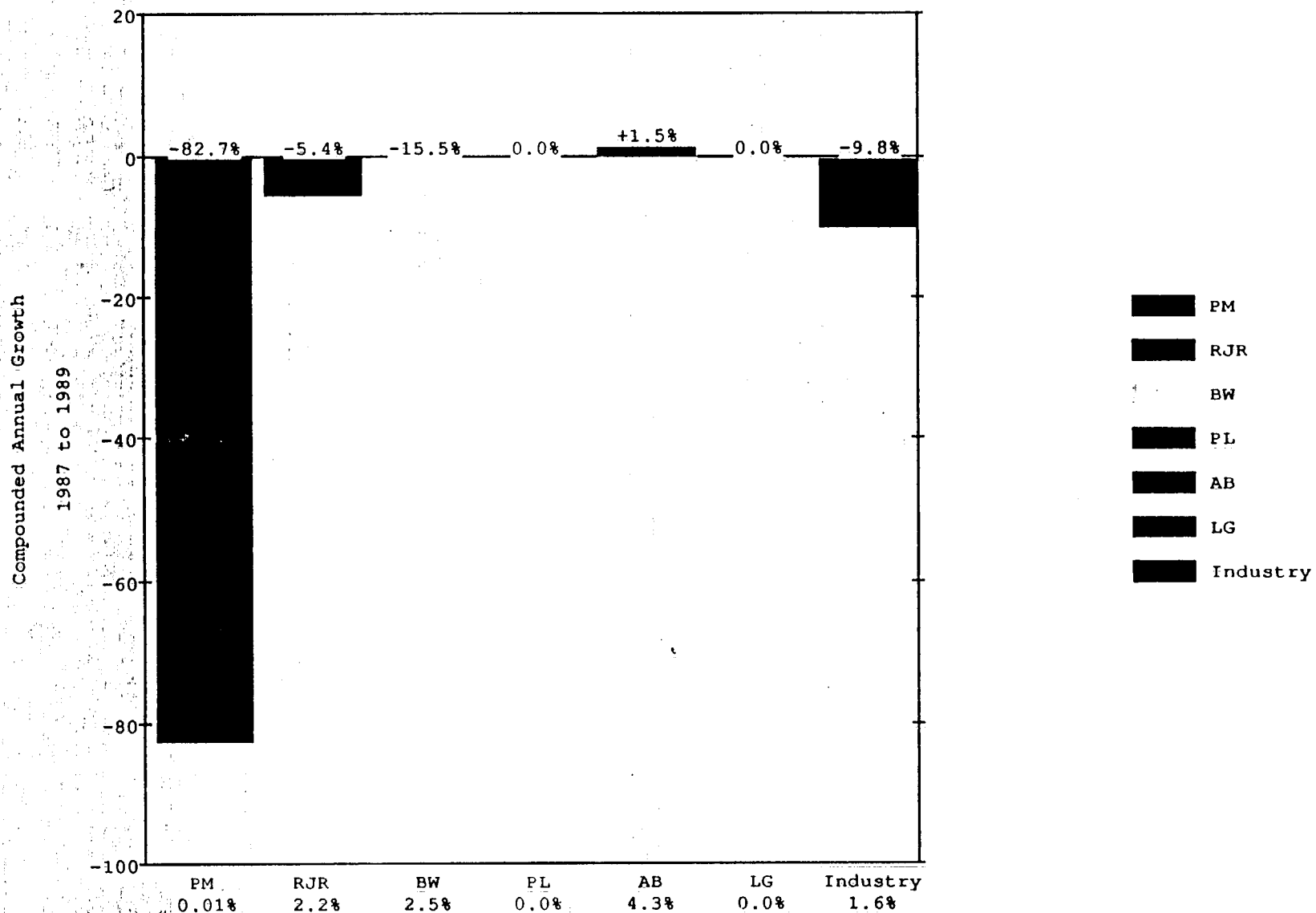
1989 Market Share (2.9%)

Total Volume = 15.3 Billion Units

2026230514

Ultra Low Tar Filter Segment

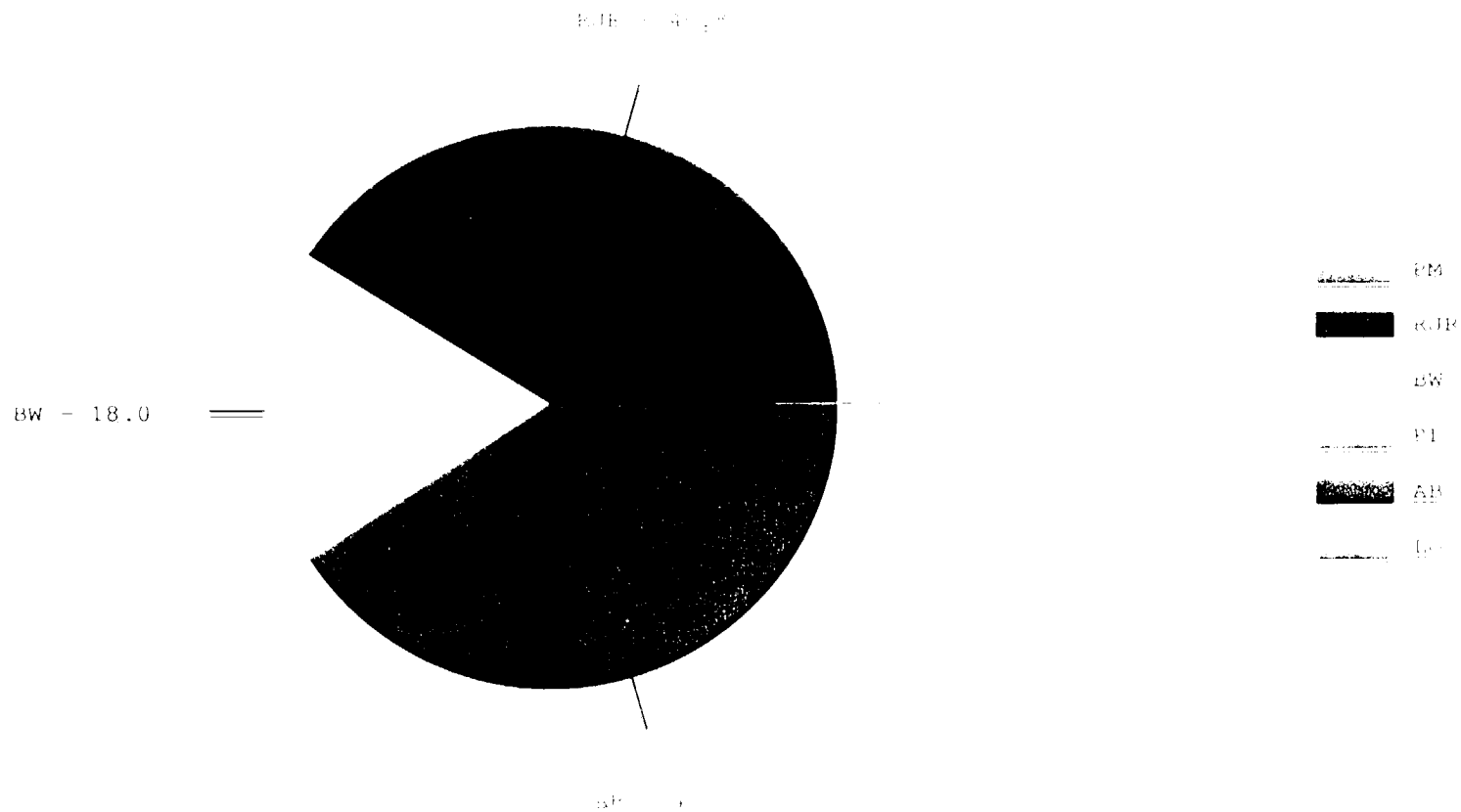
2026230515



% = Segment Volume / Company Volume

* Cambridge < 0.5 discontinued

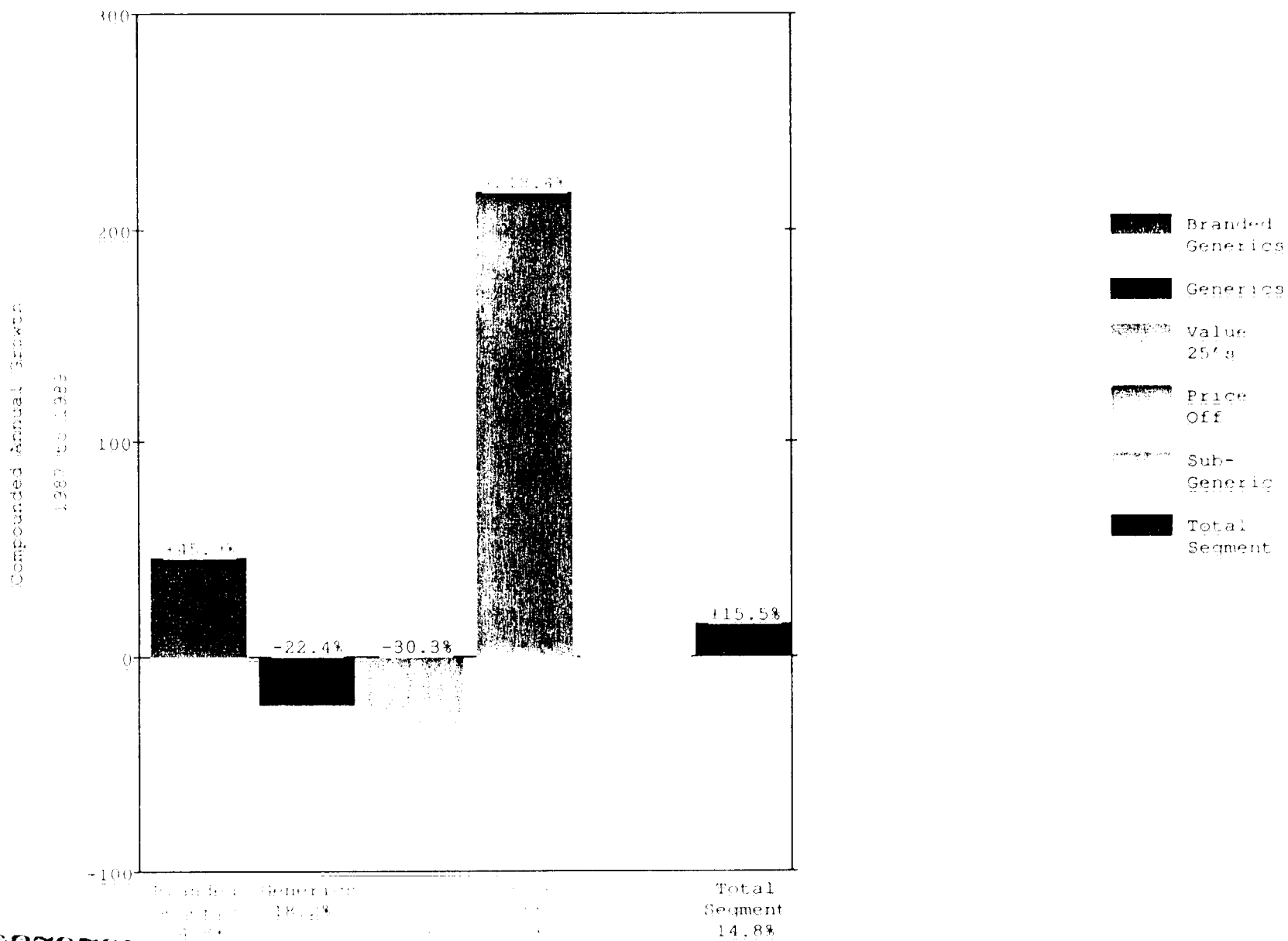
Ultra Low Tar Filter Segment
1989 Market Share



20202020202

1989 Market Share (1.6%)
Total Volume = 8.3 Billion Units

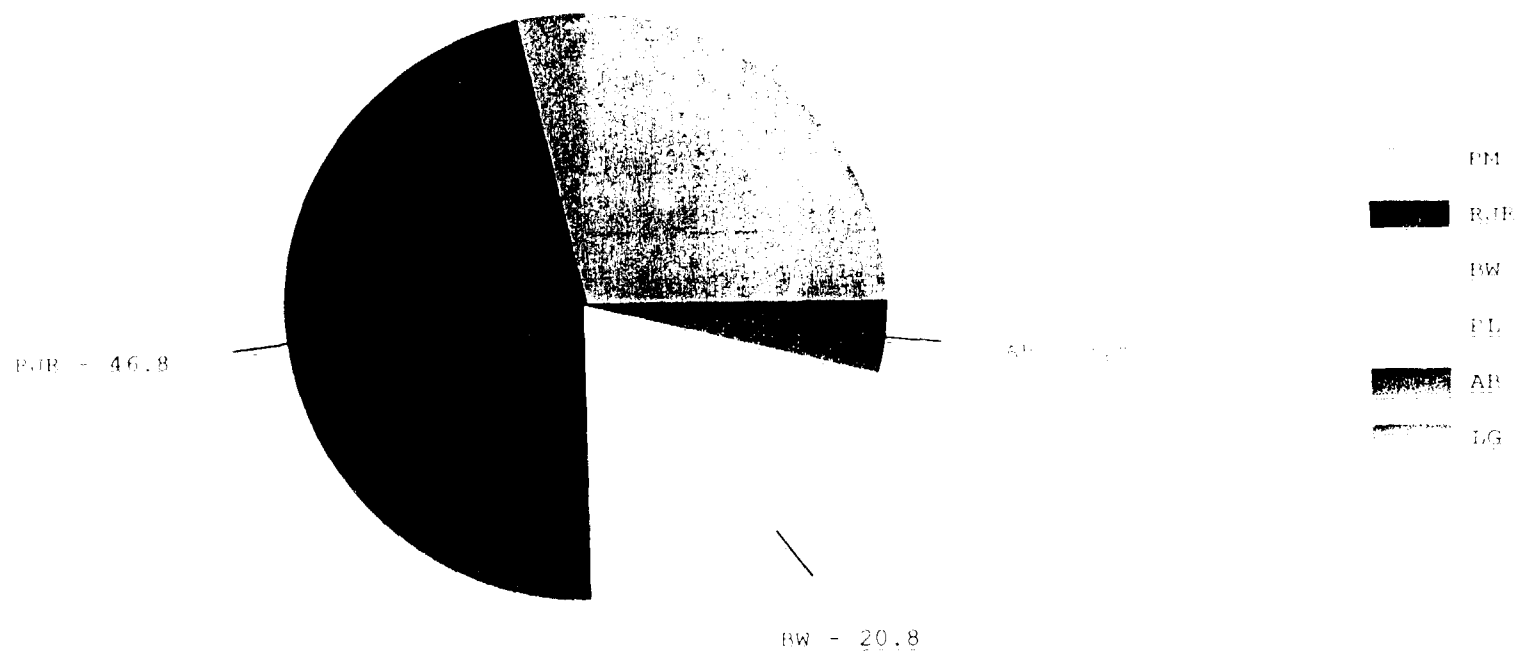
Price / Value by Type



2026230517

* Segment Volume / Company Volume

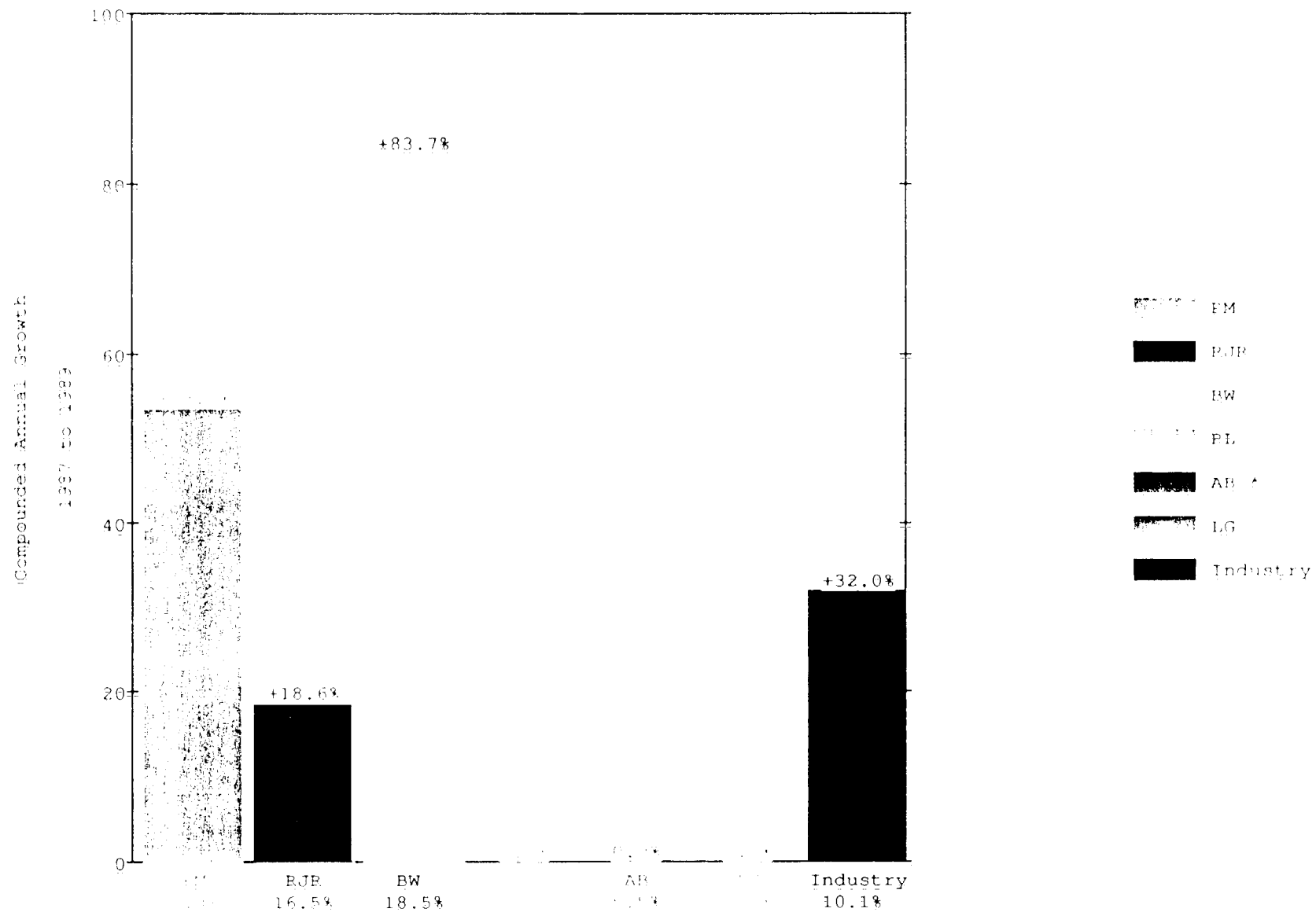
Branded Generics
1989 Market Share



1989 Market Share (10.1%)
Total Volume - 52.8 Billion Units

2026230518

Branded Generics



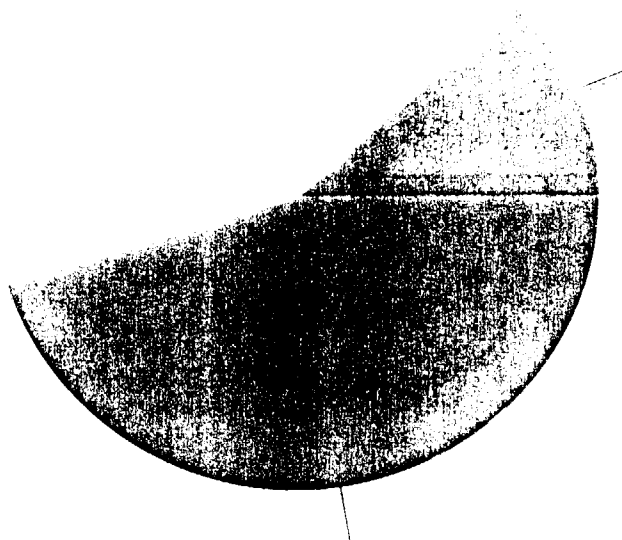
* - Segment Volume / Company Volume

* American Lights Introduced in 1988

2026230519

Generic Segment
1989 Market Share

BW - 42.8

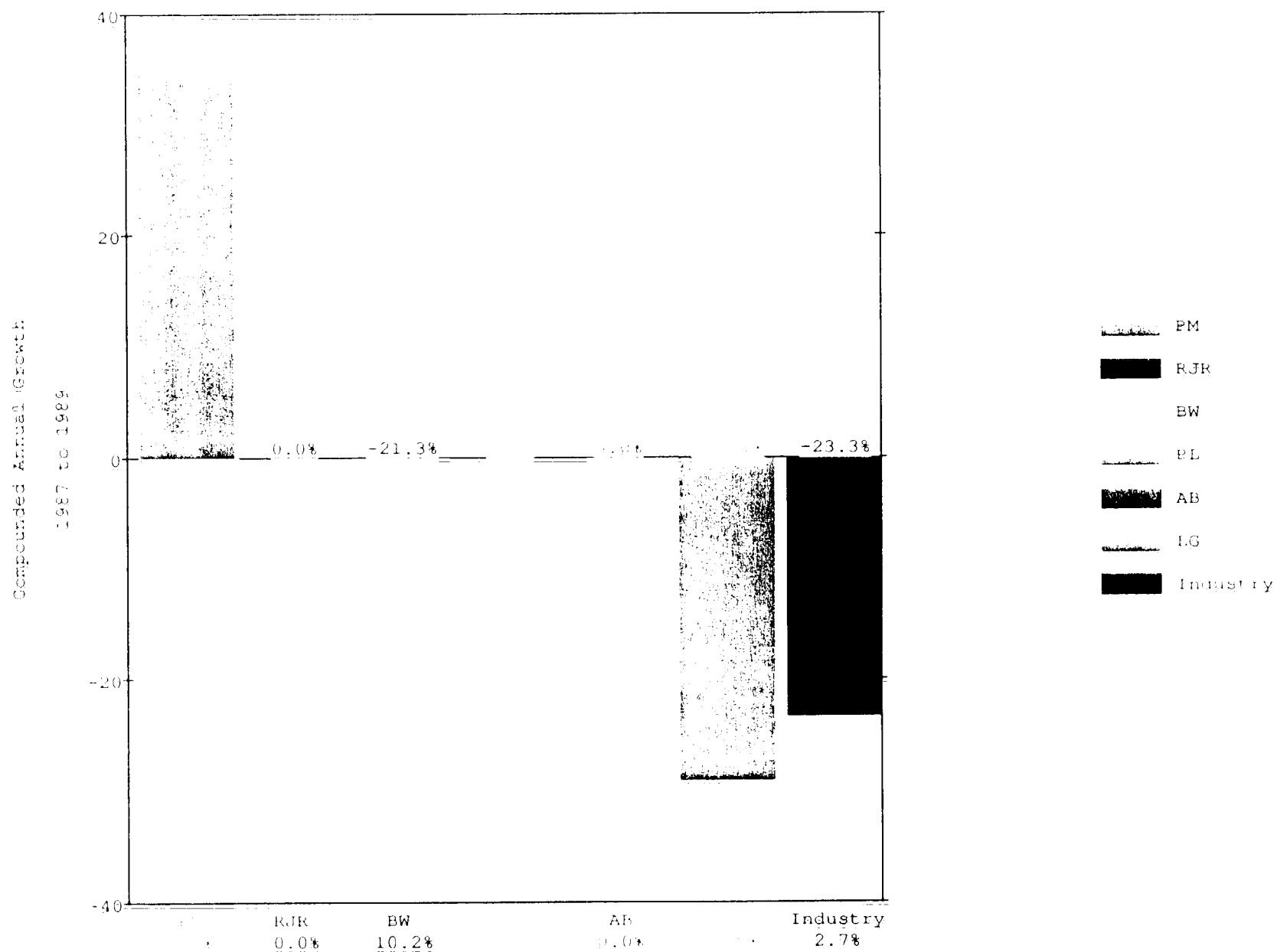


PM
KJR
BW
PL
AB
L-3

1989 Market Share (2.7%)
Total Volume = 14.1 Billion Units

2026230520

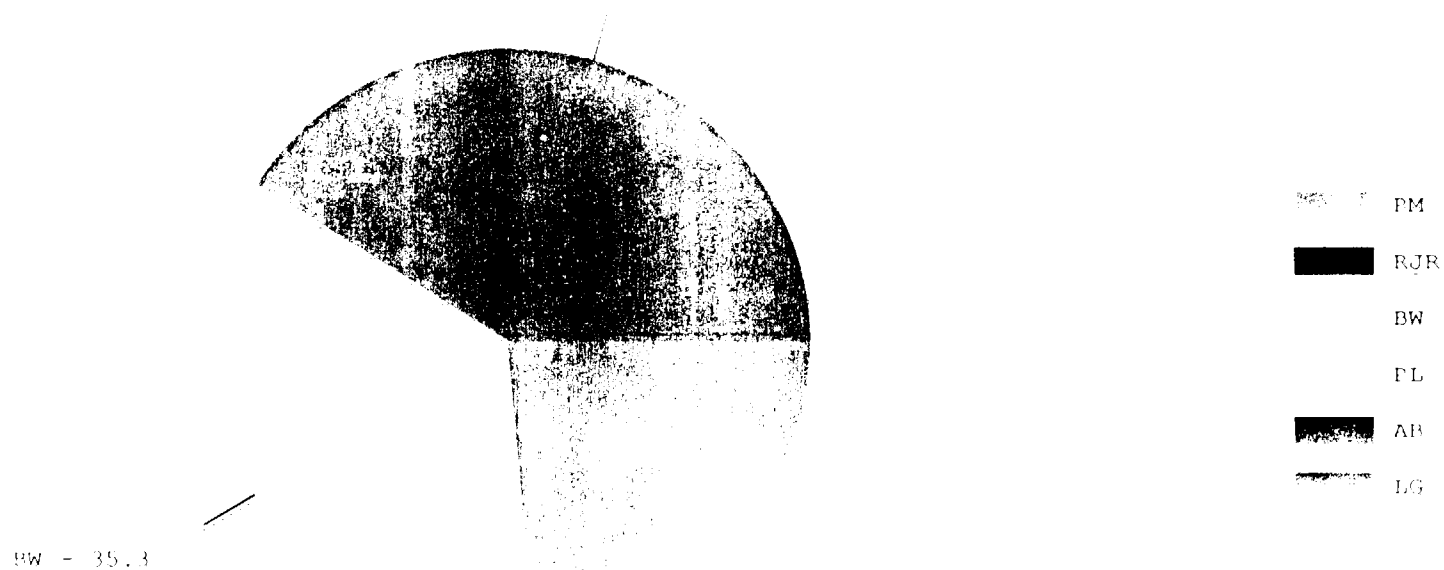
Generic Segment



* = Segment Volume / Company Volume

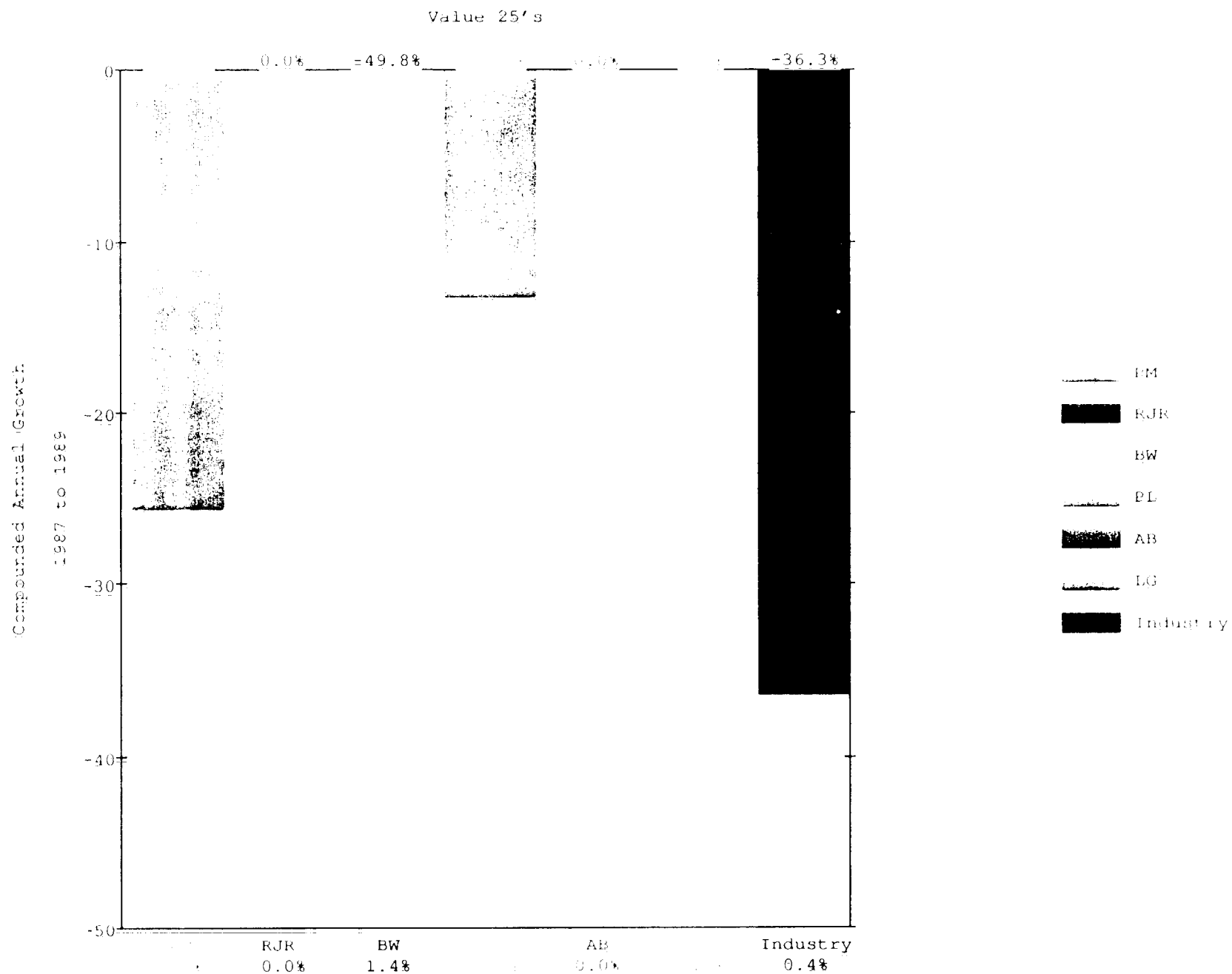
2026230521

Value 25's
1989 Market Share



1989 Market Share (0.4%)
Total Volume = 2.3 Billion Units

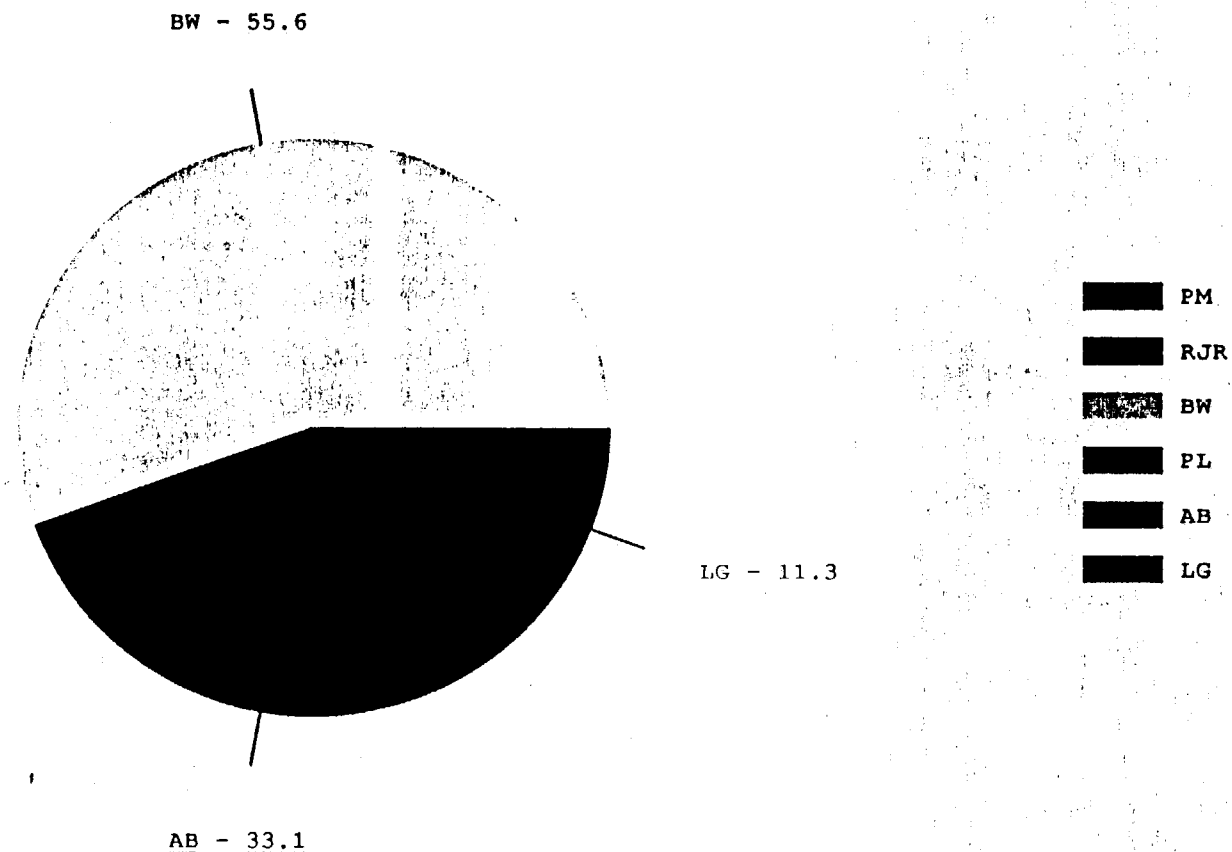
2026230522



* = Segment Volume / Company Volume

2026230523

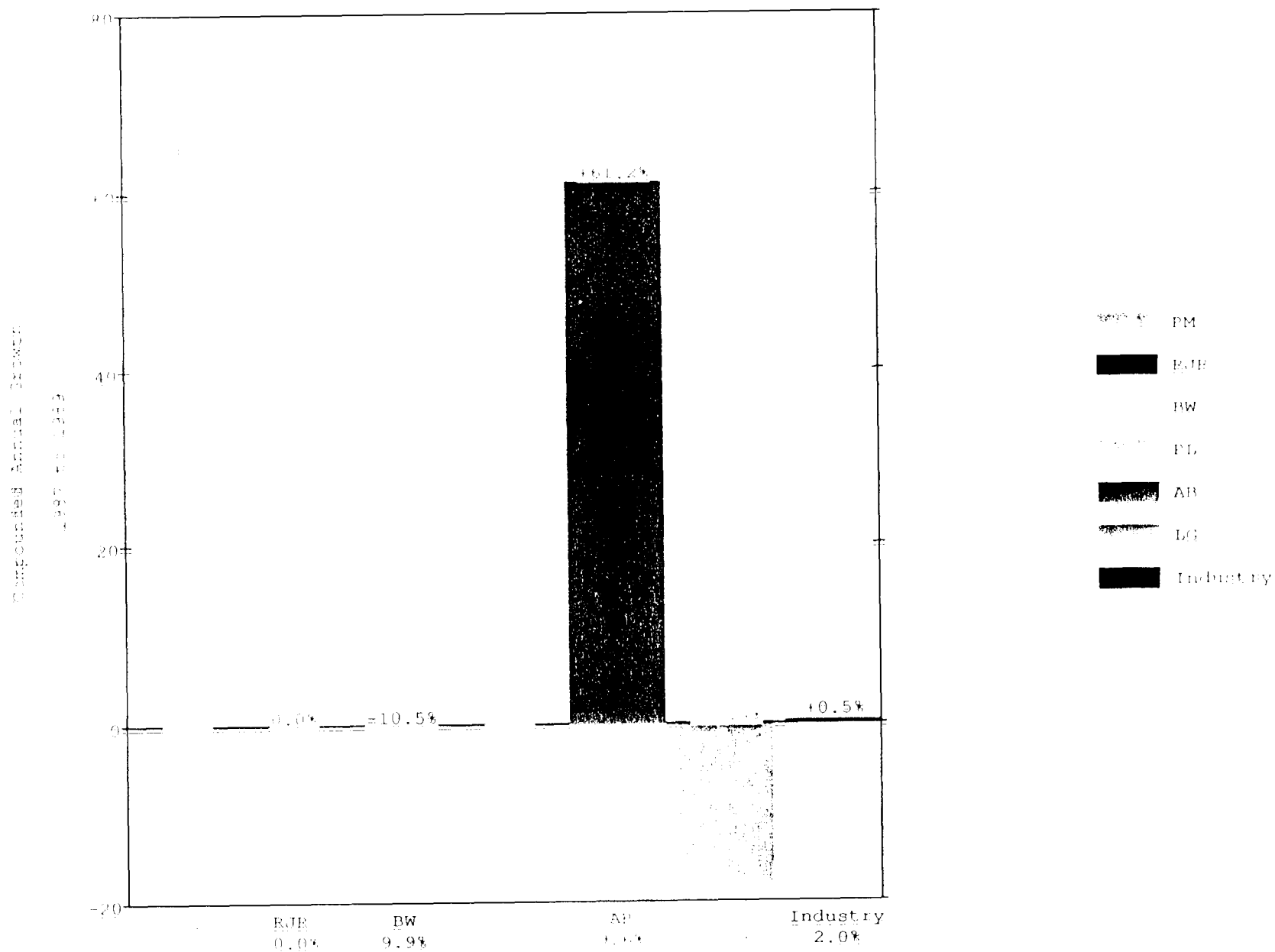
Price - Off (Coupon)
1989 Market Share



1989 Market Share (2.0%)
Total Volume = 10.6 Billion Units

2026230524

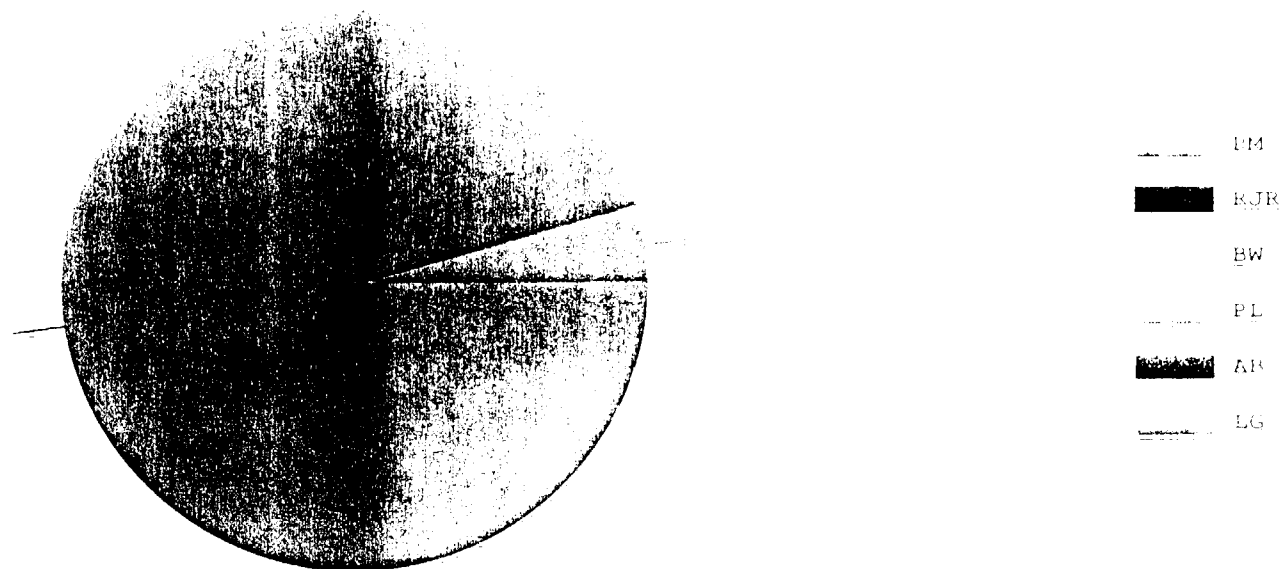
Price - Off (Coupon)



* Segment Volume / Company Volume

2026230525

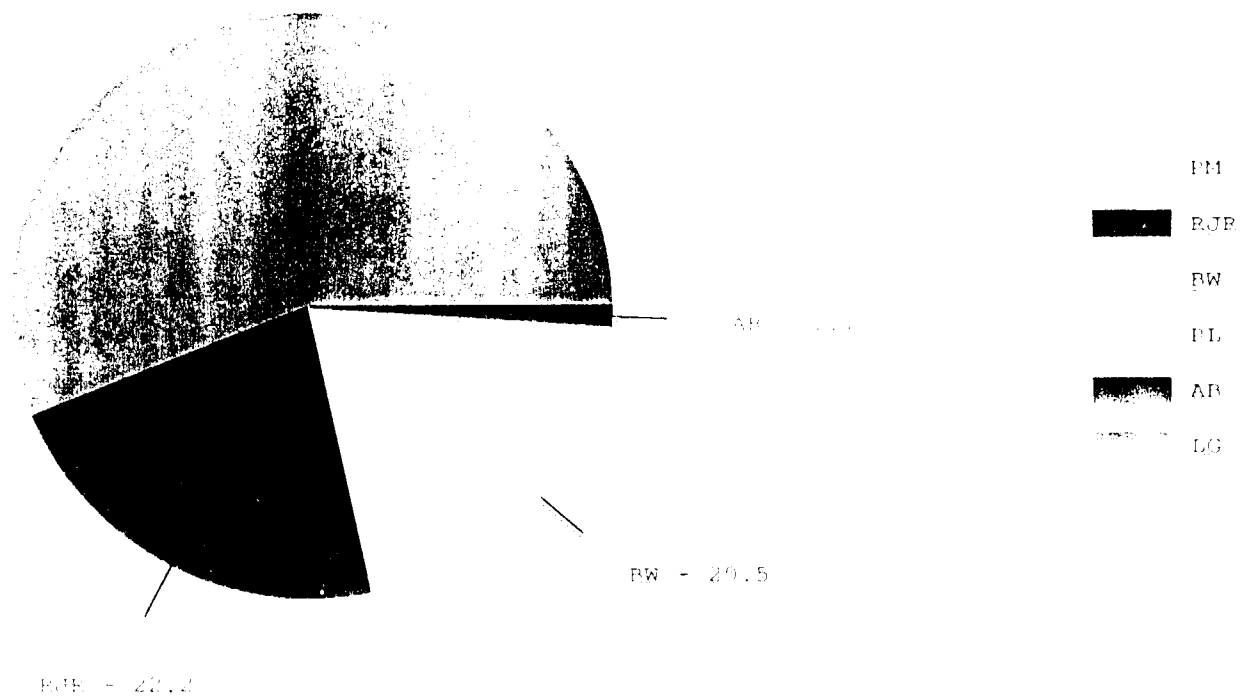
Sub - Generic
1989 Market Share



1989 Market Share (0.9%)
Total Volume = 4.7 Billion Units

2026230526

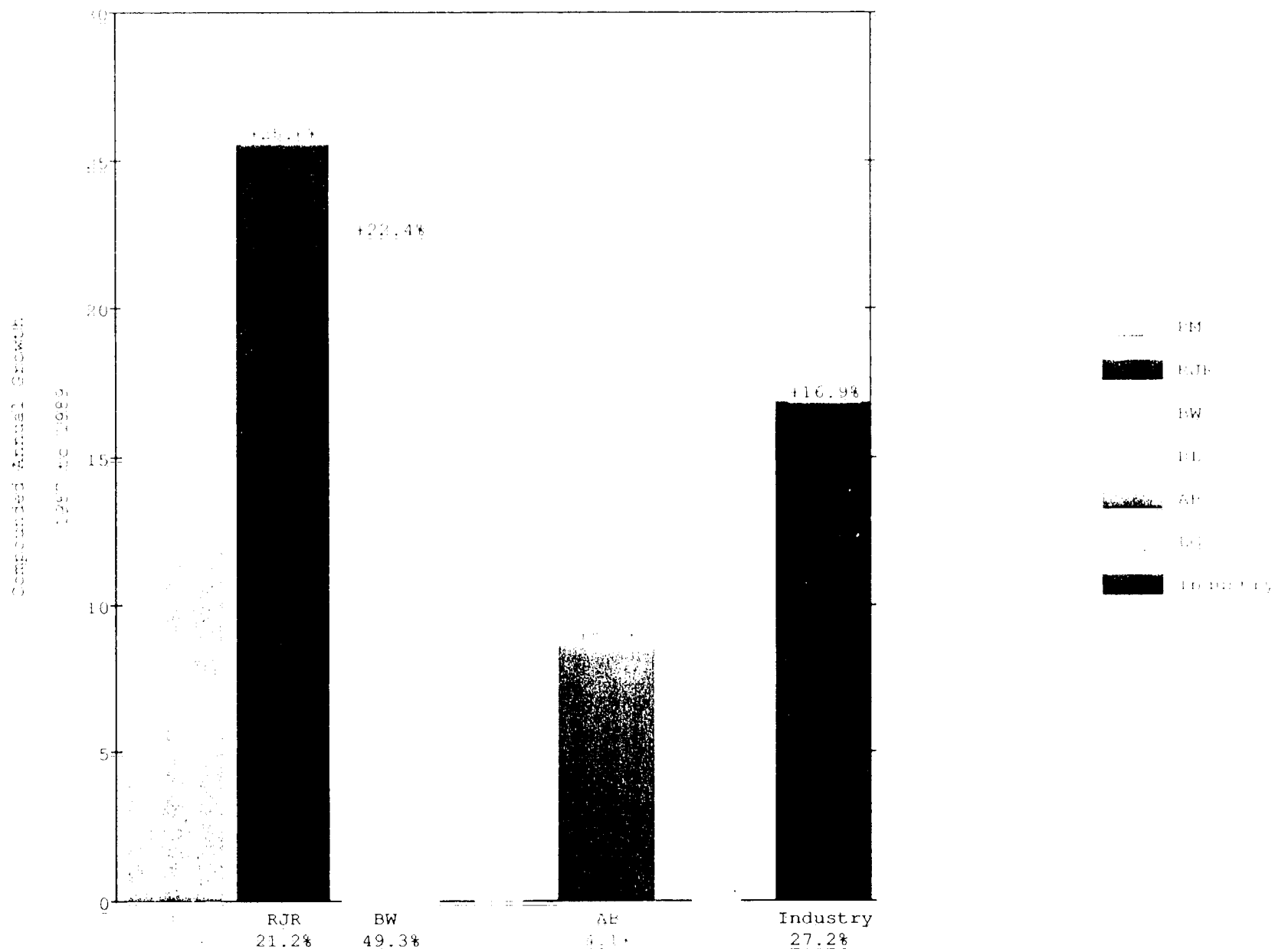
Export
1989 Market Share



1989 Export < Domestic (27.2%)
Total Volume = 142.7 Billion Units

2026230527

Export



• = Segment Volume / Company Volume

2026230528

APPENDIX K

Response and Impact of Anti-Tobacco Legislation in Canada

2026230530

PHILIP MORRIS U. S. A.
INTER-OFFICE CORRESPONDENCE
Richmond, Virginia

To: Dr. E. B. Sanders Date: 1990 August 10
From: M. Z. DeBardleben
Subject: Industry Response to, and Impact of, Anti-Tobacco Legislation in Canada

There are only three cigarette manufacturers in Canada:

Imperial Tobacco Ltd.
RJR-Macdonald
Rothmans-Benson & Hedges

These companies explain the proliferation of anti-tobacco legislation in the country as a direct result of the wide publicity about the alleged effects of environmental tobacco smoke. Apparently Canadians are extremely environmentally conscious and have allowed these policies to encroach on their personal freedoms in the name of environmental protection. However, as early as last summer [Tobacco Reporter, August 1989] it was reported that "there are increasing signs that many Canadians. . .are beginning to react against this particular brand of extremism."

On the other hand, it appears that much of the credit for the anti-tobacco movement in Canada actually belongs to the combined forces of the Nonsmokers' Rights Association and the Canadian Cancer Society. These organizations have decided to play hardball with the tobacco industry, countering every move with their own strategic response. They carefully timed their press releases to coincide with actions by the industry, and their headlines were bold and provocative: WILL TOBACCO INDUSTRY DECEPTION OUTMUSCLE PARLIAMENT? or GANGRENE AND TOBACCO. They accused legislators of collusion with the industry, or of conflict of interest, by scheduling news conferences in the legislators' own districts and suggesting that their constituents question the integrity of their elected representatives. They retained Canada's most prestigious law firm to deliver an opinion on the personal liability of tobacco company executives for failing to warn the public that cigarettes are lethal and addictive. When that opinion stated that, according to Canadian tort, charges of criminal negligence could be filed against the executives, the organizations stood mute for nine months until the day when the tobacco industry was making its case against the proposed Tobacco Products Control Act before the House of Commons. The news headlines then screamed: JAIL TOBACCO BOSSES, GROUP SAYS!

2026230531

The two societies state that their key to success was "the recognition of the hopelessness of the traditional strategies, such as trying to fight the plague of tobacco-induced diseases with sweet reason, gentle persuasion, and endless fund-raising for biological research." [The Washington Monthly, July-August 1990]. They instead used advertising and public relations to win the support of the man in the street and lobbying to make allies of the legislators and publishers. The lesson they have taught the world is: "Politicians are sure to hear you when you take your case to the public." Or to put it another way, Kenneth Kyle, a Canadian Cancer Society lobbyist, asked: "Why spend millions on microbiologists and not on lawyers, if the lawyers will be more effective in fighting the tobacco epidemic?" After the passage of the Tobacco Products Control Act, William Neville, the primary lobbyist for the tobacco industry, "grudgingly" revealed what the Canadian antismoking lobby had done: "Clearly one of the . . . successes of the antitobacco lobby was to make this appear to be a health issue, and when that happens that is a difficult area for the industry."

As early as 1984 the Nonsmokers' Rights Association showed its steel when it lost its campaign to prevent the sponsorship of the Canadian Ski Association's team in the national championships by RJR-Macdonald (Export A brand). So much media attention was paid to this issue that the health minister and the minister of fitness and amateur sport adopted a policy whereby for every dollar national sports bodies receive from the tobacco industry they will lose an equal amount from their federal funding.

By the winter of 1987 an extensive campaign to convince leading newspapers to reject tobacco advertisements had resulted in success among five major Ontario dailies, accounting for 20% of the circulation throughout all of Canada. These were shortly joined by The London Free Press and Montreal's Gazette, the former widely read in the tobacco-growing areas of the country and the latter being the largest daily in Eastern Canada. By way of comparison, only eleven American newspapers, mostly small dailies representing 0.6% of daily circulation, have adopted such a policy.

We have looked at the 1988-1990 press relevant to the Canadian situation and can identify the following pieces of legislation. Their passage was given the ultimate boost when the Nonsmokers' Rights Association, using its uncanny timing, began 1988 with an advertisement in Canada's most influential newspaper, The Globe and Mail, featuring a photograph of two friends who would rather have kept their relationship secret: Brian Mulroney, the prime minister, and William Neville, president of the Canadian Tobacco Manufacturers' Council.

Legislation

7/88 Tobacco Products Control Act (a single violation carrying a fine of up to \$250,000), to be implemented as follows:

1/89 All tobacco advertisement banned from magazines, newspapers, radio, and television (radio and television advertising was voluntarily withdrawn by the manufacturers in 1971); no advertising of Canadian tobacco products in foreign magazines sold in Canada; all tobacco sponsorships must be held under the corporate rather than the brand name of a tobacco product; rebates on tobacco products illegal; no new in-store advertisements; distribution of free samples prohibited; use of tobacco brand names on nontobacco items (mugs, hats, shirts) prohibited

Company defenses against smokers' lawsuits were weakened by disallowing the use of government warnings as a shield from liability "if the companies had known of but failed to disclose particular additional health hazards relevant to the litigation"

1/91 All tobacco advertisements on billboards banned

1/93 All tobacco advertisements in retail stores, including brand-related materials, banned

1/89 164% increase in federal taxes on cigarettes over 1/85 (plus additional provincial taxes)

1/89 Non-smokers' Rights Act, involving:

All smoking banned in federal workplaces; tobacco put under the Hazardous Products Act; smoking severely restricted in buses and other forms of public transportation; except for designated areas, all smoking prohibited in federally regulated workplaces (banks, broadcasting studios, government agencies)

7/89 Employers required to set aside 75% of space in offices and factories as non-smoking areas

Health warnings must be at the top of billboards and must occupy at least 20% of the space (for billboards erected after this date)

8/89 Smoking prohibited by House of Commons staff and visitors (but not by members of Parliament or their staff)

10/89 Tax increase on fine-cut tobacco for roll-your-own cigarettes

11/89 Unattributed health warnings (4 rotating messages) must cover at least 20% of front and back of cigarette packs:

Smoking reduces life expectancy
Smoking is the major cause of lung cancer
Smoking is a major cause of heart disease
Smoking during pregnancy can harm the baby

1/90 54% increase in federal taxes on cigarettes over 1/89 (plus additional provincial taxes)

1/90 Additional 4 unattributed health warnings (8 rotating messages):

Smoking is addictive¹
Sidestream smoke can harm non-smokers
Smoking causes lung disease
Smoking causes strokes;

must cover at least 25% of front (in English) and back (in French) of cigarette packs; must be in black and white print; must be at top vs. bottom of package; pack must contain an insert to elaborate on the

¹ This is a "world first." The tobacco industry has successfully defeated all attempts to print this warning on packages in every country where it has been sought, other than in Canada.

warnings, and this insert must hinder the removal of the cigarettes by the consumer; the "toxic contents" of tobacco smoke must be listed on the side of the pack; tar and nicotine data listed on the packs must use the ISO method² ; CO content must be listed on the side of the pack; fine-cut products for roll-your-own cigarettes must list tar, nicotine, and CO values, even though there is no standard method for determination [All of the above is to be phased in beginning 1/91 with full implementation by 6/91]

7/90 Smoking banned on Canadian airline flights of less than 6-hour duration [originally part of the Non-smokers' Rights Act]

11/90 Cigarettes destined for sale in Ontario must have yellow band on packs stating "Ontario"; all cigarettes made for export must have message on pack, "Only for sale outside Canada"

1/91 Additional value-added tax of 7%

Industry Response

Reactions to the legislation in Canada have been varied. As noted above, there is some hope for the industry in the reported feeling that Canadians are beginning to object to so many infringements. But although the following "reactions" have been documented in the trade press, it does not appear that the tobacco industry has waged an aggressive or innovative war against the growing anti-tobacco sentiment.

Lawsuits

Imperial Tobacco and RJR-Macdonald have filed a joint suit in the Superior Court in Quebec against the Tobacco Products Control Act

² The ISO method requires smoking to a shorter butt length, thereby providing greater numbers for tar and nicotine.

Imperial Tobacco and Rothmans-Benson & Hedges have filed a joint **suit in the Superior Court in Quebec** against the Tobacco Products Control Act

Rothmans-Benson & Hedges has filed a **suit in the Federal Court in Toronto** against the Tobacco Products Control Act

Canadian tobacco farmers have filed a **suit against the federal government** for excessive federal and provincial cigarette taxes

Public Relations

Multi-million dollar campaigns portrayed the tobacco companies as **defenders of the freedom of speech**, even if tobacco products ads were to be directed at children under thirteen ("Children under 13 today, so why not 14, 15, or 16 tomorrow?")

Examples of the **"failed" advertising bans in the Scandinavian countries** were touted³

Small shopkeepers were enlisted to write **protests to members of Parliament**; the letters, "some with deliberate typographical errors to create an aura of authenticity," were prepared by the industry for the shopkeepers⁴

A **press event** in Toronto, sponsored by Rothmans and including "recruits" from the arts community, denounced the Tobacco Products Control Act as "potentially dangerous because, **by ending the promotion of tobacco products, it would starve culture and sports**"⁵

³ The Canadian Cancer Society reacted to this tactic of the industry by bringing the chairman of the Norwegian Council on Smoking and Health to Ottawa, where he produced evidence that the ban had worked.

⁴ A full-page advertisement in the press divulged this tactic to the public, further discrediting the tobacco industry and preventing their use of approximately an additional 800,000 names on their mailing lists.

⁵ However, the anti-tobacco forces gathered four times as many artists to speak against tobacco sponsorship.

Corporate Reorganization

Imperial Tobacco and RJR-Macdonald have **incorporated new companies** under their most popular brand names so that they can continue sponsorships (e.g., duMaurier Ltd.); Rothmans-Benson & Hedges did not have to take this step, for obvious reasons

Rothmans-Benson & Hedges has **closed a manufacturing plant** in Mount Royal, outside of Montreal

Patrick J. Fennell, CEO/president of Rothmans-Benson & Hedges, has publicly stated that **inevitably the 3 manufacturers will become 2**; in 3-5 years Rothmans will **begin to diversify**

All three manufacturers are considering **increasing their sales staff** to promote brands "personally" under the advertising ban

Promotions

Manufacturers began offering discounts to consumers in response to the excessive taxes, and this **retail price discounting** is on the increase⁶

Manufacturers are considering **more brightly-designed, eye-catching packaging** to off-set the 25% required warnings

RJR-Macdonald changed the packaging of its Vantage brand to **match the U.S. packaging**, since 65% of all magazines read in Canada are from the U.S. and they hope to piggyback on U.S. advertising⁷

Imperial Tobacco and Rothmans-Benson & Hedges have decided **not to erect any new billboards**, because of the health-warning requirements;

⁶ Rothmans-Benson & Hedges is being sued over this, since rebates are illegal under the Tobacco Products Control Act. RBH maintains that discounts are not rebates.

⁷ Canadian smokers are considered the most brand-loyal of any in the world. There seems to be some, but little serious, concern about Canadians switching to U.S. brands because of products advertised in Canadian-read foreign magazines.

although RJR-Macdonald said that it would continue to advertise on billboards, it has not erected any new ones either

Introductions

The only new product we can identify is Superroll 200 Number 7 Supercut, a fine-cut roll-your-own product introduced by Rothmans-Benson & Hedges 11/89^{*}

Fallout

Rather than reveal **additives** in its cigarettes, **RJR-Macdonald stopped using them**; **Philip Morris stopped shipments** of its cigarettes into Canada

Manufacturers **withheld remittance to the government of increased sales taxes** of 0.50/package in 4/89 until the federal budget was passed in 12/89, allowing the manufacturers to enjoy the interest on almost \$630 million

Manufacturers expect that the cost of changing their packaging so frequently to comply with the required warnings will prompt them to **eliminate small or marginal brands** from their product lines

Smuggling has become a booming business, both inter-country and inter-provincial; the resident Indians have also discovered a source of income with **black-market tobacco products**, since they are allowed to purchase without paying the excessive taxes

The **duty-free shops** have become a goldmine for Canadian cigarette manufacturers on both sides of the Canadian/U.S. border; **exports are up**

^{*} We cannot verify this through J. E. Wickham, since he no longer follows the Canadian market.

The anti-tobacco coalition is now trying to push through legislation requiring **all cigarettes to have generic packaging**; they also are trying to place a **ban on all chewing tobacco**

Decreased sales (down 6.66% in 1989 over 1988) are being attributed by the industry to increased taxes rather than to "changes in the incidence of smoking":

<u>1989</u>	<u>1988</u>
160 brands/extensions	169 brands/extensions
4900 mfg employees	5041 mfg employees

Scandinavian Countries

Of related interest is the effect of the ban on tobacco advertising in Norway, Finland, Denmark, and Sweden. Sweden is a snuff (snus) market; Denmark is a cigar/cigarillo market; Norway is a fine-cut market; Finland is a cigarette market. The tobacco industry in Canada has pointed to these studies to show that advertising bans are not effective. As stated above, the Nonsmokers' Rights Association and Canadian Cancer Society arranged for the health minister from Norway to appear before Parliament to refute these industry claims.

Finland

A ban on the advertisement of tobacco products, along with far-reaching smoking restrictions, was instituted in **1973**. The tobacco products market is **growing**.

Norway

A ban on the advertisement of tobacco products was instituted in **1975**. The market for tobacco products is considered **steady**, with a rise in cigarette demand off-setting a decline in smoking tobacco demand.

2026230539

Denmark

There is very little anti-tobacco legislation in Denmark, with the exception of advertising directed at youth. However, the country has been experiencing a **steady decline** in the consumption of tobacco products.

Sweden

Restrictions on smoking have been in place since 1971, and an advertising ban is presently planned. With the exception of the fine-cut products, the tobacco market in general has shown a **steady decline**.

Analysts explain the situation in the Scandinavian countries by out-of-sight/out-of-mind, i.e., "the ban on advertising has made the 'enemy' invisible." There are no longer discussions and debates about the effects of tobacco consumption in the press or on the radio or television, with the bans in effect in Finland and Norway for so very many years. And the consumers therefore follow their own minds. However, the theory that advertising does not affect tobacco consumption is not widely held outside the industry, and anti-tobacco factions still point to the decline of consumption in Canada as a direct result of the advertising ban and other restrictions rather than the severe increases in taxation.

cc: Central File



2026230540

Lightweight cigarette
sparks controversy
in Canada

Imperial Tobacco's lightweight, experimental cigarette is drawing heavy opposition from the Canadian Cancer Society.

Tobacco in each cigarette is injected with air, making it weigh much less than standard cigarettes. Canada taxes tobacco based on weight. Thus, the air-injected cigarettes are less expensive. The price difference can be substantial. In the province of New Brunswick, a carton of standard cigarettes costs about c\$35. A comparable amount of the new product costs less than c\$18.

2026230542

APPENDIX L

EHS Five-Year Environmental Plan

Draft

2026230543

Environmental, Health & Safety

Five Year Plan

1991 - 1995

2026230544

TABLE OF CONTENTS

Overview	1
Explanation of Responsibility	2
Air Issues	
Combustion Sources & SO ₂ /NO _x	3
PM-10 Particulates	4
Pollutants and the Upper Atmosphere	5
Toxic Air Emissions	6
VOC Emissions	7
Water Issues	
Phosphorus & Nitrogen Reductions	8
Storm Water Discharge Permits	9
Underground Storage Tanks	10
Waste Issues	
Burning Used Oil	11
Hazardous Waste Management	12
Solid Waste Minimization	14
Superfund Sites	16
Hazardous Materials Issues	
Asbestos	17
Chemical Hygiene Plan	18
Chemical Inventory Management	19
HVAC/Boiler System Water Treatment	21
Indoor Air Quality	22

PHILIP MORRIS USA
E,H&S PLAN : 1991-1995

TABLE OF CONTENTS *(continued)*

Hazardous Materials Issues *(continued)*

Pesticide Management	23
Radiation	24
Transportation of Hazardous Materials (DOT)	26

Employee Safety & Health Issues

Ergonomics	27
Workers' Compensation	28

Environmental, Health & Safety - General Issues

Audits	29
Emergency Management Plan	30
Training	31

OVERVIEW

To be completed

2026230547

PHILIP MORRIS USA
E,H&S PLAN : 1991-1995

EXPLANATION OF RESPONSIBILITY

Abbreviation:	Department:
• EEP	Employee & Environmental Protection
• ENG	Engineering
• FAC	Facility
• FIN	Finance
• IS	Information Services
• LEGAL	Legal (NY Legal or Hunton & Williams)
• MED	Medical
• PA	Pesticide Administrator (QA)
• PUR	Purchasing
• QA	Quality Assurance
• R&D	Research & Development
• RSC	Radiation Safety Committee
• RSO	Radiation Safety Officer (QA)
• SEC	Security
• TRANS	Transportation

For each **Action Plan** listed, primary responsibility is assigned by department(s) or in special cases by title. It is recognized that for many **Action Plans** several departments may require involvement; however, only those groups with responsibility for coordination are included. If more than one department is listed, the first department has overall coordinating responsibility.

Action Plans assigned to FAC (facility) apply to specific facilities, if applicable, and should be included in the facility's Five Year Plan.

2026230548

AIR ISSUES

2026230549

AIR - COMBUSTION SOURCES & SO₂/NO_x

Issues:

- EPA has promulgated regulations to restrict the amount of sulfur dioxide (SO₂) and nitrogen oxides (NO_x) that can be emitted from new boilers. Fuels with lower sulfur content are being required to meet emission limits.
 - NO_x contributes to the formation of lower level ozone (smog) in urban areas. SO₂ contributes to the formation of *Acid Rain*.
-

Strategy:

- Secure cleaner fuel sources at reasonable cost: Bring natural gas to boilers; negotiate for low sulfur oil.
 - Be prepared to institute SO₂ controls: Construct and operate SO₂ scrubbers; install flue gas desulfurization.
 - Be prepared to institute NO_x controls: Install low NO_x burners; install ammonia injection into flue gas.
 - Ensure compliance with air permits for proper sulfur content of fuels.
-

Action Plans:

Responsibility:

1. Investigate the availability (short and long term) of an uninterrupted supply of natural gas.
2. Prepare preliminary design and cost data on equipping boilers for natural gas operation if availability is confirmed.
3. Investigate the feasibility of purchasing steam from a cogeneration facility to reduce environmental liabilities of boiler operations.
4. Prepare preliminary designs and costs on equipping boilers with low NO_x burners and ammonia injection into flue gases.
5. Audit purchase of fuels to ensure proper sulfur content per air permits.

PUR

ENG

ENG

ENG

EEP

2026230550

AIR - PM-10 PARTICULATES

Issues:

- EPA has changed the definition of Particulate Matter (*PM*) to include smaller particles. This definition, which is referred to as *PM10*, includes particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
 - At this time all particulate emissions are assumed to be *PM10* unless testing data demonstrates otherwise.
 - As EPA and the states gain experience in estimating *PM10* emissions, more restrictive controls could be required.
-

Strategy:

- Identify particulate sources and assess particulate size distribution. Use this data to assess the impact on new emission points.
-

Action Plans:

Responsibility:

- | | |
|---|---------|
| 1. Identify all sources of particulate emission. | EEP |
| 2. Measure size and quantity from a representative sampling of systems at each location to determine potential impact. | EEP |
| 3. Evaluate dust collection technology for efficiency in the capture of particulates. Prepare preliminary design and cost estimates to upgrade control equipment to meet new regulations. | ENG/EEP |

2026230551

AIR - POLLUTANTS AND THE UPPER ATMOSPHERE

Issues:

- Scientists believe that depletion of the upper ozone layer will cause increased health risks.
 - Chlorofluorocarbons (CFC's) emitted from manufacturing processes are targeted for reductions in order to protect the upper ozone layer (*Montreal Protocol*).
 - Carbon dioxide (CO₂) emissions are believed to be contributing to the *Greenhouse Effect* (e.g., a gradual global warming). EPA is looking at CO₂ emissions and assessing the need for control.
 - PM USA directly emits large amounts of carbon dioxide to the atmosphere from manufacturing and fuel burning processes, and indirectly emits CFC's from air handling equipment and fire suppression systems.
-

Strategy:

- Minimize carbon dioxide and CFC emissions (e.g., reclaim, reuse, reduce or modify processes).
 - Plan for the eventual elimination of CFC's based on vendor substitution.
-

Action Plans:

1. Identify and quantify emissions.
2. Monitor the availability of current CFC's and substitutes as well as pricing trends for each.
3. Determine the impact of refrigeration capacity if refrigerants with lower performance ratings will be required.
4. Evaluate operating, maintenance and cost impacts of changes in refrigeration technologies.
5. Identify potential CFC recycling vendors.
Approve vendors and methods of recycling.
6. Evaluate methods for CO₂ control or recovery from process discharges, and impact on operation, maintenance and cost. Determine cost per pound and % of recovery.

Responsibility:

EEP
ENG
ENG/FAC
ENG
EEP/ENG
ENG

2026230552

AIR - TOXIC AIR EMISSIONS

Issues:

- Congress will require the control of toxic air emissions through amendments to the Clean Air Act. Kentucky, Virginia and North Carolina already have toxic emission regulations.
 - Public awareness to air toxic emissions is increasing due to Community Right-To-Know reporting and media disclosure.
 - Emissions that may require further control include: phosphine (warehouse fumigation), nicotine, and ammonia.
-

Strategy:

- Assess compliance with state standards through scientific analysis of emissions and act upon this assessment.
 - Reduce and gradually eliminate phosphine emissions from warehouse fumigations.
-

Action Plans:

Responsibility:

- | | |
|--|---------|
| 1. Identify and quantify emissions, to include computer modeling. | EEP/FAC |
| 2. Investigate and estimate the cost to reduce emissions based on regulations and modeling. | ENG/EEP |
| 3. Research the degradation of identified emissions to better define levels at the fence line. | R&D |
| 4. Evaluate the use of activated charcoal adsorption systems to clear fumigated warehouses. | ENG |
| 5. Work with Tobacco Stabilization Corp. for the technical review of emissions computer modeling during fumigation aeration. | R&D |
| 6. Reduce the amount of phosphine used to fumigate warehouses based on historical data. | QA/R&D |
| 7. Install systems to treat tobacco with Kabat, thereby reducing fumigation of tobacco warehouses. | ENG |
| 8. Implement further tobacco treatment with Kabat. | QA/R&D |

2026230553

AIR - VOC EMISSIONS

Issues:

- Volatile Organic Compound (VOC) emissions contribute to the formation of lower level ozone (smog).
 - EPA is exerting greater pressure on the states to develop control strategies to reduce VOC emissions, especially in major urban areas (e.g., Richmond, Charlotte and Louisville).
 - States have no choice but to control existing emitters of VOC's and to restrict any new emission sources.
 - New emissions of VOC's will not be allowed in urban areas, unless there is a 120% reduction of emissions somewhere in the area to offset any new emissions.
 - VOC offsets and reductions could affect manufacturing flexibility and the introduction of new products or processes.
 - The definition of VOC is being expanded by EPA to regulate a broad range of substances. Ethanol, propylene glycol and glycerin are considered VOC's.
 - PM USA has entered into consent agreements with the Virginia Air Board to control VOC (ethanol) emissions from Richmond factories and Colonial Heights Packaging.
-

Strategy:

- Reduce VOC emissions through control technologies and process changes.
 - Develop plans to reduce or control VOC emissions beyond what is currently required by the states.
 - Comply with consent agreements.
-

Action Plans:

Responsibility:

1. Identify and quantify emissions.
2. Research the best technologies for VOC control. Install appropriate controls for VOC emission reductions at Richmond facilities.
3. Upgrade exhaust and incineration systems at Colonial Heights Packaging to reduce emissions.
4. Continue research on processes which will allow reduction in current VOC use.
5. Develop mechanism to coordinate research activities with other functions to discuss process or raw material changes to reduce VOC emissions.

EEP/FAC

ENG/FAC

ENG/FAC

R&D

R&D

2026230554

WATER ISSUES

2026230555

WATER - PHOSPHORUS & NITROGEN REDUCTIONS

Issues:

- EPA has given the states broad powers to control the discharge of nutrients like phosphorus and nitrogen.
 - In 1988, Virginia banned the sale and use of phosphate detergents.
 - In 1989, Virginia passed a phosphorus reduction regulation requiring all discharges over 1 million gallons per day to reduce phosphorus to 2 parts per million. Park 500 is covered by this regulation.
 - Virginia is also seriously considering regulating the discharge of nitrogen compounds. Ammonia, which contains nitrogen, is already regulated as a toxic pollutant.
 - Both Park 500 and the Blended Leaf Plant discharge significant quantities of phosphorus and nitrogen.
-

Strategy:

- Reduce the phosphorus discharges at Park 500 to meet state standards.
 - Study BL Plant and Park 500 process discharges, review available treatment methods and report on the feasibility and economies of further reducing phosphorus and nitrogen discharges.
-

Action Plans:

1. Upgrade the Park 500 wastewater treatment plant to remove phosphorus.
2. Install a biological nitrogen removal *pilot plant* at Park 500.
3. Evaluate pre-treatment systems for BL Plant.

Responsibility:

FAC/ENG

FAC/ENG

FAC/ENG

2026230556

WATER - STORM WATER DISCHARGE PERMITS

Issues:

- The Clean Water Act requires the EPA to issue permits for all discharges of pollutants; however, the EPA opted not to include storm water discharges in the permitting process.
 - Environmental groups successfully sued the EPA to require permits for storm water run off from industries and municipalities.
 - The deadline for applying for storm water permits has passed but EPA has not yet published regulations or application forms for these new permits.
-

Strategy:

- Comply with regulations when they are promulgated.
-

Action Plans:

1. Identify all storm water discharge points that will require a permit.
2. Develop specific plan when final EPA rule is issued.

Responsibility:

EEP/FAC

EEP

2026230557

WATER - UNDERGROUND STORAGE TANKS

Issues:

- EPA and the states have issued new underground storage tank (UST) regulations requiring corrosion protection, spill and overflow prevention, and leak detection for all UST's.
 - Prior to implementation of the new regulation 15 tanks were removed and replaced; however, there are still 7 old UST's remaining.
 - Leaking tanks must be prevented—clean up of an UST spill is very expensive.
-

Strategy:

- Continue to upgrade or replace UST's at all locations.
 - Replace UST's with aboveground tanks where feasible.
 - Ensure that procedures for operation, maintenance, leak monitoring and spill prevention of new and existing UST's are maintained.
-

Action Plans:

1. Develop a PM USA Tank Management Plan.
2. Remove and/or replace old UST's with above ground tanks or UST's that meet new standard.
3. Implement leak detection and UST maintenance program for all underground tanks.
4. Develop Spill Prevention Plans (SPCC) for all new above ground tanks.

Responsibility:

EEP
FAC
FAC
EEP/FAC

2026230558

WASTE ISSUES

2026230559

WASTE - BURNING USED OIL

Issues:

- PM USA pays waste oil recyclers to dispose of waste oil. In addition to the cost, there is potential liability if the vendor mixes our waste oil with other wastes that might contain hazardous materials.
-

Strategy:

- As allowed and permitted under state air pollution regulations, burn used oil.
-

Action Plans:

Responsibility:

- | | |
|---|---------|
| 1. Identify sources and quantities of waste oil. | FAC/EEP |
| 2. Determine most viable location(s) for burning oil. | FAC/EEP |
| 3. Construct waste oil storage facilities. | FAC |
| 4. Establish procedures for routine testing, collection, transport and audit. | EEP |

2026230560

WASTE - HAZARDOUS WASTE MANAGEMENT

Issues:

- Hazardous materials, as defined by the EPA, are banned from all *municipal* landfills. These materials can be disposed of in *hazardous waste* landfills if they meet new treatment standards. However, industry is faced with the following:
 - Some treatment standards are too restrictive and unattainable.
 - Hazardous waste landfills are scarce and filling to capacity.
 - Most, if not all, of these landfills have contamination problems.
 - The few states with hazardous waste landfills are trying to restrict wastes from other states.
 - The only viable option for disposal of some types of hazardous waste is incineration at permitted hazardous waste facilities; however, the ash resulting from incineration is also a concern if it contains certain toxic materials. Landfilling the ash may become more restrictive. Disposal costs are steadily increasing and reputable disposal facilities are becoming scarce.
 - Most of our hazardous waste is generated in laboratories.
 - Some wastes, such as tobacco dust mixed with sand or dirt, may at a later date be classified as hazardous.
 - Waste generated by contractors performing PM USA work pose potential liabilities.
-

Strategy:

- Reduce the quantity of hazardous wastes.
 - Increase disposal flexibility while reducing potential liability for illegal or improper disposal.
 - Control contractor generated hazardous waste.
-

Action Plans:

Responsibility:

- | | |
|--|--------|
| 1. Develop and maintain a tracking system and database of hazardous waste generated and disposal sites. | EEP/IS |
| 2. Expand the list of approved hazardous waste disposal facilities to be able to get competitive pricing. | EEP |
| 3. Continue to audit all disposal facilities for compliance. | EEP |
| 4. Evaluate laboratory testing procedures to find ways to substitute hazardous with non-hazardous materials, and thus minimizing hazardous waste generation. | R&D |

2026230561

WASTE - HAZARDOUS WASTE MANAGEMENT *(continued)*

Action Plans:

Responsibility:

5. Implement the R&D waste control program in the QA laboratories.
6. Evaluate methods to remove sand from tobacco prior to processing.
7. Develop and implement a pre-treatment system to dispose of process waste at Bermuda Hundred.
8. Establish procedures to properly manage and dispose of contractor-generated hazardous waste.

R&D/QA

R&D

ENG/R&D

EEP/PUR

2026230562

WASTE - SOLID WASTE MINIMIZATION

Issues:

- Federal, state and local laws and regulations are mandating solid waste minimization and recycling as existing landfills are rapidly filling to capacity and new landfills are costly to develop and operate.
 - EPA has set a national goal to reduce the nation's municipal wastes 25% by 1992.
 - States are beginning to legislate landfill reductions for local governments. Virginia and North Carolina are legislating increases in *recycling* (Virginia—25% by 1995, North Carolina—25% by 1993, Kentucky—no activity at this time.) In Virginia, cities and counties must submit comprehensive waste minimization plans by July 1991.
 - PM USA generates approximately 59,100 tons of solid waste annually: 69% is mixed waste and 31% is process waste.
 - Currently, 16% of mixed waste is recycled, with a total recycle potential of 65%. 3% of the process waste is recycled, with a total recycle potential of 50%.
 - Some wastes may be considered proprietary materials thus requiring special handling or exclusion from recycling and other minimization efforts.
-

Strategy:

- Develop a coordinated solid waste minimization program with emphasis on *recycling* and *source reduction*.
 - By 1992, recycle 65% of the mixed waste with an emphasis on paper waste.
 - By 1992, recycle 50% of the process waste with an emphasis on waste sludge.
 - Increase the use of recycled materials in all appropriate areas of the business (e.g., office/administrative areas).
-

Action Plans:

Responsibility:

1. Prepare a written, integrated PM USA Solid Waste Management Plan. Assign overall coordination to EEP.
2. Develop and maintain a tracking system and database for all solid waste streams.
3. Identify individual(s) within each facility as focal points for communication, reporting and results.
4. Identify sensitive components for exclusion from this activity, or for special handling [e.g., proprietary materials].

EEP

EEP/IS

EEP

R&D

2026230563

WASTE - SOLID WASTE MINIMIZATION *(continued)*

Actions Plans:

Responsibility:

- | | |
|---|---------|
| 5. Negotiate a contract to implement a material recycling facility, for recycling approximately 65% of mixed solid waste. | EEP/PUR |
| 6. Develop appropriate employee awareness programs to support the material recycling concept. | EEP |
| 7. Establish criteria to purchase recycled materials. Identify applications for recyclables and test them. | PUR/EEP |
| 8. Develop methods for disposal of Park 500 sludge. | ENG |
| 9. Study methods to reuse or minimize generation of sand from stemming. | EEP/ENG |
| 10. Study uses for flyash. | ENG |
| 11. Review processes to identify potential source reductions. | FAC/ENG |

2026230564

WASTE - SUPERFUND SITES

Issues:

- The Superfund law (CERCLA) allows the EPA to collect the entire cost of cleaning up a toxic dump site from anyone who contributed to the site.
 - Many old, legally permitted disposal sites are becoming Superfund sites as the EPA identifies problems at them.
 - In the last year, PM USA has been notified of two Superfund sites which may contain PM materials.
 - Other PM companies are also involved in Superfund sites (estimated at 50).
-

Strategy:

- Ensure today's disposal sites do not become tomorrow's Superfund sites.
 - Monitor status of disposal sites currently being used to assess any changes in their regulatory status.
-

Action Plans:

1. Annually review each disposal site used and assess regulatory status. If a site closes, evaluate potential impact on company.
2. Continue auditing and approving all disposal sites prior to using them.
3. Work with other operating companies to coordinate sites where more than one operating company is involved.

Responsibility:

EEP/LEGAL

EEP

EEP/LEGAL

2026230565

HAZARDOUS MATERIALS ISSUES

2026230566

HAZARDOUS MATERIALS - ASBESTOS

Issues:

- OSHA standards regulating asbestos exposures were recently reduced from 2.0 fibers per cubic centimeter (f/cc) of air to 0.2 f/cc. There is a new proposal to lower the limits even further.
 - Asbestos is also regulated by the EPA and several state agencies. This creates difficulties for compliance efforts since industry must deal with several agencies which have different, and at times conflicting, agendas.
 - Since 1981, PM USA has managed asbestos and removed it as needed through the use of contractors. No comprehensive plan budgeting for all removal has been implemented.
 - Asbestos is encapsulated throughout all facilities; however, inadvertent release and potential product contamination is a possibility.
-

Strategy:

- Remove the remaining asbestos from all facilities.
 - Ensure that all asbestos sites are identified and clearly marked until removal is complete.
-

Action Plans:

1. Develop plant specific plans to identify and mark the remaining asbestos, determine the cost of removal, and establish a schedule for removal.
2. Establish a special expense account to track and budget for removal costs.
3. Monitor and document removal projects.

Responsibility:

FAC

FIN

EEP

2026230567

HAZARDOUS MATERIALS - CHEMICAL HYGIENE PLAN (LABORATORIES)

Issues:

- OSHA has promulgated a new standard entitled *Occupational Exposures to Hazardous Chemicals in Laboratories*.
 - The standard requires that a written Chemical Hygiene Plan be prepared and implemented for all laboratories by January 31, 1991.
 - R&D and QA labs are affected by this standard.
 - PM USA laboratories currently maintain programs that are considered part of this compliance requirement.
-

Strategy:

- Comply with the standard by developing a Chemical Hygiene Plan, incorporating existing programs.
-

Action Plans:

Responsibility:

- | | |
|---|------------|
| 1. Identify all laboratories that are affected. | EEP |
| 2. Write PM USA Chemical Hygiene Plan. | EEP/R&D/QA |
| 3. Update lab designs and equipment to meet requirements, if required. | FAC |
| 4. Review laboratory job procedures for completeness and protective equipment. Update or develop as required. | FAC |
| 5. Develop training program for current employees, as well as for new or transferred employees. | EEP |
| 6. Establish mechanism for identifying new or transferred employees. | EEP/IS |
| 7. Conduct training company-wide. | EEP/FAC |
| 8. Audit compliance. | EEP |

2026230568

HAZARDOUS MATERIALS - CHEMICAL INVENTORY MANAGEMENT (*RIGHT-TO-KNOW*)

Issues:

- Regulations require that inventories be maintained of chemicals used throughout all facilities:
 - OSHA requires that a current inventory of all hazardous chemicals known to be present in each facility must be compiled, maintained and made available to employees.
 - EPA requires that a current hazardous chemical inventory be prepared for emergency planning and community right-to-know, and that certain materials be reported to various state and local officials, as well as the EPA.
 - Virginia Health Department requires annual chemical inventory reporting of substances used as raw materials, catalysts, final products or process solvents.
 - Maintaining inventories is labor intensive and is often out-of-date as soon as it is completed. It is estimated that 3,000 distinct chemicals in over 6,000 container types and storage locations must be tracked. The labor to maintain this effort is estimated to cost about \$360,000 per year.
 - Different chemicals are often purchased for the same type of job, thus increasing the inventory of distinct chemicals which must be tracked and reported.
 - Accuracy of these inventories is extremely important to ensure that materials are not under or over reported. Unfortunately, the current method is inaccurate and labor intensive, thus maintaining compliance is quite difficult. Over the last 16 months there has been 5 instances where information was needed but could not be immediately located.
 - A mainframe computer program (*Chemical Inventory Subsystem—CISS*) is maintained to manage all the reporting requirements—this program works. The primary issue is obtaining the information which goes into the system.
 - Contractors are required to notify PM USA of materials brought onto PM property; however, this is often not done.
-

Strategy:

- Computerize the process of tracking, linking it to the *CISS*.
 - Minimize the purchase of different chemicals for the same job.
 - Control the use of chemicals by contractors working on PM property.
-

Action Plans:

1. Define specific requirements to automate a tracking system.

Responsibility:

EEP

2026230569

HAZARDOUS MATERIALS - CHEMICAL INVENTORY MANAGEMENT *(RIGHT-TO-KNOW) (continued)*

Action Plans:

Responsibility:

- | | |
|--|---------|
| 2. Define current computerized company systems, assess linkage and conduct feasibility study based on system requirements. | IS |
| 3. Develop a tracking system based on the feasibility study. | IS |
| 4. Review the purchase of chemicals and set a company policy to control redundancy and duplication. | PUR |
| 5. Develop better controls for contractors to ensure review of their materials. | PUR/EEP |

2026230570

HAZARDOUS MATERIALS - HVAC/BOILER SYSTEM WATER TREATMENT

Issues:

- Hazardous materials must be used to maintain and operate HVAC systems.
 - Microbial activity in HVAC systems must be controlled to prevent the onset of illnesses.
-

Strategy:

- Operate and maintain HVAC systems to minimize employee exposure to water treatment chemicals and microbial activity.
-

Action Plans:

Responsibility:

- | | |
|---|---------|
| 1. Investigate different methods of filtration of washer air streams that would reduce biocide requirements. | ENG |
| 2. Identify systems where water volume reductions may be made without interfering with equipment performance. | ENG/FAC |
| 3. Identify systems where bulk or mini-bulk systems may be used to reduce the number of pumping stations. | ENG/FAC |
| 4. Evaluate new biocides, polymers and bio-rational techniques which may be substituted for current biocides. | QA |
| 5. Evaluate water side filtration for dust and microbial removal. | ENG |
| 6. Develop products and techniques to remove microbial masses from HVAC systems during manual cleaning. | ENG |
| 7. Restrict the use of compressed air in clean-up of tobacco dust or turn off washer air intakes during cleaning. | FAC |

2026230571

HAZARDOUS MATERIALS - INDOOR AIR QUALITY

Issues:

- Exposure to chemicals in the workplace continues to be a major priority of OSHA.
 - Some materials are not regulated, yet they can cause irritation in some individuals. Although these materials are not specifically regulated, OSHA can enforce compliance through the *General Duty Clause*. Menthol falls within this group.
 - Extensive monitoring has taken place throughout PM facilities (approximately 4200 sample results to date); however, most of this monitoring has not been based on a planned schedule, but rather on an as needed basis.
-

Strategy:

- Monitor indoor air quality on a planned basis to ensure on-going OSHA compliance.
 - Develop internal PM standards for materials that are not specifically regulated and which may cause irritation.
-

Action Plans:

Responsibility:

- | | |
|---|-------------|
| 1. Identify materials that should be monitored on a planned basis, and establish a schedule. | EEP |
| 2. Develop a mainframe based system for scheduling and tracking monitoring which interfaces with the current industrial hygiene data management system. | IS/EEP |
| 3. Identify unregulated materials for which internal standards should be developed. Develop standards and include in plan. | EEP/R&D |
| 4. Develop and implement exposure reduction plans based on environmental monitoring. | FAC/ENG/EEP |
| 5. Investigate and mitigate any incident of sick building syndrome or employee illness. | EEP/ENG/FAC |

2026230572

HAZARDOUS MATERIALS - PESTICIDE MANAGEMENT

Issues:

- There is a growing public concern about the practices of the pest control industry overall.
 - The company must ensure that the use of pesticides does not draw unnecessary attention to the tobacco industry.
-

Strategy:

- Minimize the use of pesticides through improved sanitation practices, performing pesticide applications only when there is a documented need.
 - Maintain a standardized and consistent approach to pesticide management to ensure employee and public safety.
 - Investigate chemical pesticide alternatives.
-

Action Plans:

Responsibility:

- | | |
|--|--------|
| 1. Implement written, verifiable sanitation programs based on the PM USA <i>Infestation Control Manual</i> . | PA/R&D |
| 2. Prepare and implement job procedures. | PA |
| 3. Update annually the "acceptable pesticides" list. | R&D |
| 4. Upgrade all pesticide storage facilities to include neutralization capabilities for containers and unused mixtures. | FAC |
| 5. Apply pesticides according to a documented need and label restrictions; when sanitation efforts have failed or in areas inaccessible to cleaning. | QA |
| 6. Develop a central tracking system for all pesticide purchases and usage. | PA/IS |
| 7. Establish in-house training programs for all pesticide applicators and their supervision including state re-certification. | PA/EEP |
| 8. Establish conditioning cycles for obtaining Phyto certificates and eliminate methyl bromide fumigations. | R&D |

2026230573

HAZARDOUS MATERIALS - RADIATION

Issues:

- PM uses radioactive sources, both licensed and non-licensed, as well as radiation producing equipment, such as x-rays. There continues to be a negative perception in the general public regarding the use and affects of radiation. Consumer products companies face the potential risk of negative publicity in the event of an incident involving a radioactive source or radiation generating device.
 - As licensed materials, nuclear radiation sources, as found in nuclear gauges, are heavily regulated and require extensive recordkeeping to ensure compliance.
 - Although nuclear gauges, using sealed radioactive sources, are reliable, safe and an accepted method for measurement, an incident involving these devices, even in a peripheral way, could cause negative publicity.
 - Several radioactive devices containing Americium, such as smoke detectors or static eliminators, are distributed to consumers without a license. Because they are not controlled by strict licensing requirements at the user level, these devices are very easily discarded improperly in municipal landfills.
-

Strategy:

- Minimize the use of radioactive sources and devices wherever possible. Investigate alternatives.
 - Strictly control the use and disposal of all radioactive sources, both licensed and non-licensed.
 - Ensure that all employees are adequately trained in the proper use and control of radioactive sources and radiation producing devices.
-

Action Plans:

1. Evaluate alternatives to all forms of radiation.
2. Determine if present source strength could be decreased (newer technology).
3. Continue to audit user group compliance to the present Radiation Safety Program.
4. Examine methods to improve the Radiation Safety Program to further minimize the potential liabilities.
5. Continue to require that all PM employees working with either nuclear devices or x-ray equipment receive *documented* training and certification for performing their assigned jobs.

Responsibility:

ENG/RSO

ENG/RSO

RSO/QA

RSO/QA

RSC

2026230574

HAZARDOUS MATERIALS - RADIATION *(continued)*

Action Plans:

Responsibility:

6. Establish formal procedures to ensure that non-licensed devices are disposed of through vendors. Audit compliance, internally and vendor.
7. Upgrade present system for mailroom security to minimize employee exposure.

RSO

SEC

2026230575

HAZARDOUS MATERIALS - TRANSPORTATION OF HAZARDOUS MATERIALS (DOT)

Issues:

- PM USA ships, both domestically and internationally, materials that are regulated as *hazardous*.
 - Major changes to the US Department of Transportation (DOT) regulations have been proposed which will change the shipping nomenclature to international standards.
 - Effective January 1, 1991, all international shipments must be packaged in containers meeting international performance standards.
 - New DOT regulations require 24 hour emergency telephone numbers and spill response information with every shipment of hazardous materials.
 - Because every facility ships hazardous materials, coordination or control of these activities is essential.
 - There has been confusion as to the responsibilities of PM USA and PM International regarding international shipments of flavors originating in Richmond.
-

Strategy:

- Comply with all domestic and international shipping regulations. Ensure the safety of employees, carriers and the public.
 - Ensure that PM USA has advanced warning of proposed changes to transportation regulations, and appropriately plans for their implementation.
 - Improve communications, training and coordination for personnel involved in shipping hazardous materials, including PM International. Ensure coordination through EEP.
-

Action Plans:

Responsibility:

- | | |
|--|-----------|
| 1. Prepare a PM USA transportation policy and procedure. Establish overall coordination and responsibility. | EEP/LEGAL |
| 2. Establish PM standardized shipping papers for all transportation of hazardous materials. | EEP |
| 3. Identify functional groups or individuals with transportation responsibilities, and provide on-going DOT training, to include new employee courses, on the job training using job procedures, and advanced or specialized seminars. | EEP |
| 4. Establish a task group to review and plan for performance packaging standards. | EEP/TRANS |

2026230576

EMPLOYEE SAFETY & HEALTH ISSUES

2026230577

EMPLOYEE SAFETY & HEALTH - ERGONOMICS

Issues:

- OSHA is seriously assessing workplace injuries and illnesses resulting from cumulative trauma and repetitive motion. Labor unions are also pushing for action in this area. The result: ergonomic regulations will be promulgated.
 - With the rapid growth in the use of personal computers, many workstations are improperly designed. Video display terminals (VDT) and keyboards are placed on existing equipment designed for typewriters, but not for computers.
 - With technological advancements in manufacturing, equipment, buttons, switches and gauges are being replaced by visual displays, touch screen communications and software controls. These innovations are only as reliable as the employee's ability to rapidly recognize and properly respond to control the desired parameters. New job functions can create new physical stresses.
 - Material handling related injuries continue to be a major category of injuries.
-

Strategy:

- Resolve the question: To what extent are PM USA employees experiencing ergonomically-related injuries or illnesses?
 - Prevent ergonomic injuries or illnesses through workplace and equipment design.
-

Action Plans:

1. Review injury and illness record to define ergonomic related cases.
2. Based on the review develop an overall ergonomic plan to focus resources on potential problems areas.
3. Develop specific criteria for workplace and equipment ergonomic design.
4. Establish vendor specifications and implement with vendors.

Responsibility:

EEP
EEP
EEP/ENG
EEP/PUR

2026230578

EMPLOYEE SAFETY & HEALTH - WORKERS' COMPENSATION

Issues:

- The cost of medical treatment for injured workers continues to rise.
 - The severity of workplace injuries, as *measured by days away from work*, has been gradually increasing for PM USA, inspite of a downward trend for the frequency of injuries.
 - The increase in severity began with the elimination of on-site company doctors and the reliance on outside physician services. Historically, outside physicians tend to keep workers off the job longer. Utilizing a company physician as liaison with local physicians is an essential element to controlling disability management.
 - Disability management continues to be a priority; however, there is no mechanism in place to track the type of treatment, length of disability and associated cost on a *physician by physician basis*. This information is necessary to ensure quality at a reasonable cost through the selection of physicians who understand the industrial environment and are willing to work with industry.
-

Strategy:

- Reverse the trend—reduce the severity of injuries by tracking physician services and cost, selecting physicians for referral based on PM USA expectations and improve relations with local physicians.
 - Reassess on-site physician coverage. Maintain a physician liaison between the company and local physicians.
-

Action Plans:

Responsibility:

1. Review the existing Claims, Medical and Hartford Insurance computer systems and develop method to track (or extract) appropriate data.
2. Develop criteria for reviewing physician services and rating on quality of service and cost based on type of injury and treatment.
3. Review the Panel of Physicians quarterly in light of the data and adjust accordingly.
4. Maintain a physician liaison.

IS/EEP/MED

MED/EEP

EEP/MED

MED

ENVIRONMENTAL, HEALTH & SAFETY
- GENERAL ISSUES -

2026230580

ENVIRONMENTAL, HEALTH & SAFETY - AUDITS

Issues:

- The stakes are increasing for non-compliance with environmental, and occupational safety and health regulations. EPA and OSHA fines can exceed a million dollars depending on the type of violation. For OSHA violations willful acts can result in *egregious* penalties.
 - Violations can result in civil and criminal action. Virginia OSHA recently developed procedures for notifying the State Attorney General's office of criminal actions.
 - Violations of regulations receive much press coverage.
 - Violations can result in consent agreements which may not be to the benefit of the company.
 - There have been efforts to standardize compliance efforts at all facilities, but there is no mechanism to ensure that all are following the plans or procedures.
-

Strategy:

- Conduct more frequent and cost effective audits.
-

Action Plans:

1. Develop and implement a PM USA Environmental, Health and Safety Audit Plan for all facilities, to be conducted annually. [evaluate the need for outside services based on resources]
2. Develop and maintain a computerized database to track audit results and corrective action. Assess portable data collection terminals linked to PC based system.

Responsibility:

EEP/LEGAL

IS/EEP

2026230581

ENVIRONMENTAL, HEALTH & SAFETY - EMERGENCY MANAGEMENT PLAN

Issues:

- EPA, OSHA and DOT are all placing more emphasis on emergency planning and response, particularly for hazardous material spills and releases.
 - OSHA recently issued a new standard entitled *Hazardous Waste Operators and Emergency Response*, which requires a written plan along with extensive training, both initially and annually, for emergency responders.
 - Community Right-To-Know initiatives by EPA have created a heightened awareness on the part of the public and the media whenever an emergency occurs involving a hazardous material, regardless of the magnitude of the incident.
 - DOT recently enacted regulations requiring emergency hazard information to be available to the shipper for the shipment of all hazardous materials.
 - Local fire departments are requiring more pre-planning on the part of industry located in their area, with special emphasis on hazardous materials.
 - PM USA first prepared a comprehensive written Emergency Management Plan (EMP) in 1983. This plan has been modified over the years to meet all the requirements of these regulations; however, the plan has not been fully implemented and maintained at all facilities.
-

Strategy:

- Maintain emergency management plans, providing the resources and training necessary to ensure that all types of emergency situations are handled properly, efficiently and in compliance with all appropriate regulations.
-

Action Plans:

1. Complete and maintain the *EMP* for all facilities, with special emphasis on site specific plans.
2. Conduct initial and annual training.
3. Conduct pre-plans with Fire Departments.

Responsibility:

FAC/EEP

EEP/FAC

FAC/EEP

2026230582

ENVIRONMENTAL, HEALTH & SAFETY - TRAINING

Issues:

- Training required by OSHA, EPA and DOT regulations continues to increase in number and in complexity. Initial and annual re-training is often required which impacts all levels of personnel. Documentation is essential to prove compliance.
 - To ensure that the appropriate personnel are trained at the proper frequency, identification of all training requirements and tracking of employees who are covered by these requirements are critical issues.
 - The *HRIS* maintains historical training records by employee, if data is entered into the system. There is no system to identify individuals who should be trained and at what frequency, or to schedule these individuals for training.
 - With the regulatory demands increasing, it is important to coordinate these training efforts to ensure consistent and timely training.
 - Job procedures are a critical element of the training program. Managing the procedures is labor intensive.
-

Strategy:

- Comply with all regulatory training requirements, and ensure that training is coordinated, scheduled, documented and tracked.
 - Incorporate job procedures into all training efforts.
-

Action Plans:

Responsibility:

1. Identify all regulated training, who is affected, and what resources will be required to maintain a training compliance effort.
2. Develop an *HRIS* scheduling and tracking system, which identifies the required training, frequency and individuals affected.
3. Implement a scheduled training program.
4. Complete and maintain the job procedure program, and integrate job procedures into all formal training.
5. Implement a network image processing system for job procedures.

EEP

IS/EEP

ER

ER/FAC

IS/EEP

2026230583

2026230584

APPENDIX M

Patents Related to Obsolescence of the Current Product

2026230585

United States Patent [19]

Ray et al.

[11] Patent Number: 4,800,903

[45] Date of Patent: Jan. 31, 1989

[54] NICOTINE DISPENSER WITH POLYMERIC RESERVOIR OF NICOTINE

[76] Inventors: Jon P. Ray, 12544 Judson Rd., San Antonio, Tex. 78233; James E. Turner, 307 Wayside, San Antonio, Tex. 78213; Michael P. Ellis, 811 River Rd., San Antonio, Tex. 78212; Ronald G. Oldham, 1410 Tarton, San Antonio, Tex. 78231

[21] Appl. No.: 738,120

[22] Filed: May 24, 1985

[51] Int. Cl.⁴ A24D 1/00; A24D 3/08; A24F 1/00

[52] U.S. Cl. 131/273; 131/270; 131/335; 128/202.21

[58] Field of Search 131/332, 270, 273, 331, 131/335, 343, 341; 128/202.21

[56] References Cited

U.S. PATENT DOCUMENTS

3,229,008 1/1966 Harrington et al. 131/343
3,393,685 7/1968 Mumpowes et al. 131/341
4,189,511 2/1980 Levers et al. 131/332

FOREIGN PATENT DOCUMENTS

2149190 4/1978 Fed. Rep. of Germany .

Primary Examiner—V. Millin

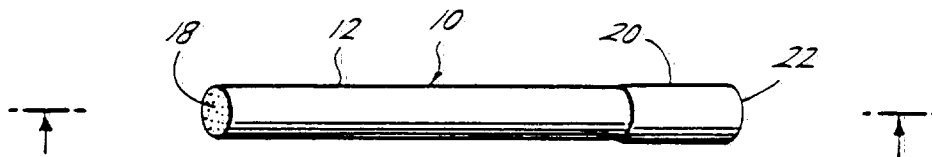
Attorney, Agent, or Firm—Arnold, White & Durkee

[57]

ABSTRACT

A nicotine dispenser comprising a polyolefin porous plug with reversibly retained nicotine therein. The dispenser is mounted in a tubular configuration to provide a cigarette-shaped product adapted to dispense nicotine vapor when air is drawn therethrough. The polymeric reservoir of nicotine comprises a polyolefin, preferably polyethylene or polypropylene, which reversibly absorbs nicotine.

39 Claims, 1 Drawing Sheet



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT DIVISION

FEB 8 1989

2026230586

United States Patent [19]
Ray

[11] Patent Number: 4,813,437

[45] Date of Patent: Mar. 21, 1989

[54] NICOTINE DISPENSING DEVICE AND
METHOD FOR THE MANUFACTURE
THEREOF

[76] Inventor: J. Philip Ray, 2929 Mossrock, Ste.
130, San Antonio, Tex. 78230

[21] Appl. No.: 569,279

[22] Filed: Jan. 9, 1984

[51] Int. Cl.⁴ A24D 1/00; A24F 1/00

[52] U.S. Cl. 131/273; 131/270;
131/335; 128/202.21

[58] Field of Search 131/273, 335, 365, 337;
128/202.21

[56] References Cited

U.S. PATENT DOCUMENTS

2,445,476 7/1948 Folkman 131/273
3,422,819 1/1969 Jones et al. 131/335
4,284,089 3/1980 Ray 131/273
4,480,644 11/1984 Luke 131/365

FOREIGN PATENT DOCUMENTS

1270933 7/1961 France 131/337

OTHER PUBLICATIONS

Wynder and Hoffman, Tobacco and Tobacco Smoke,

Studies in Experimental Carcinogenesis, pp. 496-501
(1967).

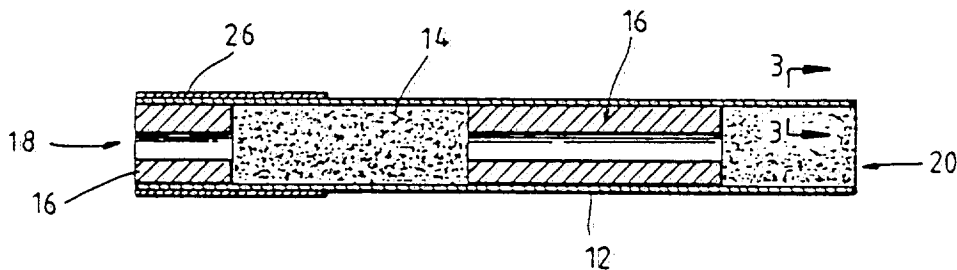
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Arnold, White & Durkee

[57] ABSTRACT

An improved nicotine dispensing device for non-pyrolytic use which is adapted to release nicotine-bearing vapors into air drawn through the device. The device comprises one or more nicotine-bearing sections, one or more insulating sections which are linearly aligned with nicotine-bearing sections and a fluid impermeable housing. The housing retains the nicotine-bearing and insulating sections. This invention also includes a method for the preparation of an improved nicotine dispensing device. The method includes the steps of preparing one or more fluid retaining sections and one or more insulating sections. The fluid retaining sections and insulating sections are linearly arranged and wrapped with a fluid impermeable housing material. A nicotine containing material is then injected into, or incorporated within, the fluid retaining sections.

7 Claims, 2 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.-PATENT SECTION

MAR 29 1989

NOTED *J. Charles*
R. Ellis
Douglas
Kent

2026230587

United States Patent [19]
Summers

[11] Patent Number: 4,817,640
[45] Date of Patent: Apr. 4, 1989

[54] HERBAL CHEW AND SNUFF
COMPOSITIONS

[75] Inventor: John K. Summers, Anderson, Ind.
[73] Assignee: Better Life International Life, Inc.,
Stuart, Fla.

[21] Appl. No.: 907,402

[22] Filed: Sep. 12, 1986

[51] Int. CL⁴ A24B 15/18

[52] U.S. CL 131/359; 131/352;
131/369

[58] Field of Search 131/359, 369

[56] References Cited

U.S. PATENT DOCUMENTS

92,497	7/1860	Webster .	
107,693	9/1879	Kilbourn .	
111,711	2/1871	Wright .	
160,138	2/1875	Appleby .	
166,155	7/1875	Sterry .	
210,538	12/1878	James .	
448,925	3/1891	Miller .	
2,298,532	10/1941	Franich .	
2,930,720	3/1960	Finberg	131/359
3,067,068	12/1962	Finberg .	
3,369,551	2/1968	Carrall	131/359
3,747,607	7/1973	Kim	131/359

FOREIGN PATENT DOCUMENTS

842 of 1776 United Kingdom .
2427 of 1859 United Kingdom .
981137 1/1965 United Kingdom .

OTHER PUBLICATIONS

"Herbal Smoking Substitutes for Tobacco," pp.
141-150, year and author unknown.

Primary Examiner—V. Millin

Assistant Examiner—J. Cheng

Attorney, Agent, or Firm—Hoffmann & Baron

[57] ABSTRACT

Compositions and methods for providing tobaccoless herbal chew and snuff products which include an herbal component capable of being encased with a casing material providing a coherent cud in the oral cavity during use. In particular the present invention contemplates the use of a nicotine-free herbal substitute, such as red clover in the case of snuff and dandelion leaf in the case of chew, which can be encased with, among other things, a binder to provide a coherent cud in the mouth during use. As a result of this invention, safe nicotine-free snuff and chew compositions can be provided.

39 Claims, No Drawings

2026230588

with said essential oil-containing herb which maintains said herb in a moist coherent cud during chewing.

2. The chewing composition of claim 1 which further comprises a flavorant and a coloring agent.

3. The chewing composition of claim 2 wherein said flavor component is selected from the group consisting of natural and artificial sweeteners, flavoring agents, spices, fruit flavors, and mixtures thereof.

4. The chewing composition of claim 2 wherein said color component is selected from the group consisting of caramel and other food grade coloring agents.

5. The chewing composition of claim 2 wherein said herb component is present in the composition of the final product in an amount of from about 40% to about 60% by weight, said casing component is present in an amount of from about 8% to about 35% by weight, said flavor component is present in an amount from about 4% to about 26% by weight, and said color component is present in an amount of from about 0.25% to about 5% by weight.

6. The chewing composition of claim 5 wherein said herb component is present in an amount of about 45% to about 55% by weight, said casing component is present in an amount of from about 15% to about 28% by weight, said flavor component is present in an amount of about 8% to about 20% by weight, and said color component is present in an amount of about 0.8% to about 3.0% by weight.

7. The chewing composition of claim 1 wherein said preservative is selected from the group consisting of a salt, powdered dandelion root, echinacea, clove powder, and mixtures thereof.

8. The chewing composition of claim 1 wherein said binder is selected from a group consisting of molasses, corn syrup, hydrogenated starch hydrolysates, and mixtures thereof.

9. The chewing composition of claim 1 wherein said humectant is selected from the group consisting of glycerin, sorbitol, invert sugar, and other moisture-maintaining materials.

10. The chewing composition of claim 1 which further comprises a bio-affecting agent.

11. The chewing composition of claim 10 wherein said bio-affecting agent is selected from the group consisting of mineral supplements, analgesics, antipyretics, antiarrhythmics, ion exchange resins, appetite suppressants, vitamins, anti-inflammatory substances, coronary dilators, cerebral dilators, peripheral vasodilators, anti-infectives, psychotropics, antimanics, stimulants, antihistamines, laxatives, decongestants, gastro-intestinal sedatives, antidiarrheal preparations, anti-anginal drugs, vasodilators, anti-hypertensive drugs, vasoconstrictors and migraine treatments, antibiotics, tranquilizers, antipsychotics, antitumor drugs, anticoagulants and antithrombotic drugs, hypnotics, sedatives, anti-emetics, anti-nauseants, anticonvulsants, neuromuscular drugs, hyper and hypoglycaemic agents, thyroid and antithyroid preparations, diuretics, antispasmodics, uterine relaxants, nutritional additives, antiobesity drugs, anabolic drugs, erythropoietic drugs, antiasthmatics, expectorants, cough suppressants, nucleolytics, anti-uricemic drugs and mixtures thereof.

12. A snuff composition comprising a nicotine-free herb containing essential oils capable of being encased and capable of being processed to a texture which is non-injurious to the surface of the oral cavity, said herb being clover, and a casing material which includes a preservative, a binder, and a humectant for combining

with said essential oil-containing herb which maintains said herb in a moist coherent cud in the mouth during use.

13. The snuff composition of claim 12 wherein said herb is hydrophilic and wherein said casing is adsorptive to said herb.

14. The snuff composition of claim 13 wherein said herb is red clover.

15. The snuff composition of claim 12 wherein said herb component is present in the final product in an amount of from about 25% to about 45% by weight, and said casing component is present in an amount of from about 35% to about 65% by weight.

16. The snuff composition of claim 15 wherein said herb component is present in an amount of from about 30% to about 40%, and said casing component is present in an amount of from about 40% to about 60%.

17. The snuff composition of claim 16 wherein said herb component is present in an amount of from about 32% to about 37% by weight, and said casing component is present in an amount of from about 45% to about 55% by weight.

18. The snuff composition of claim 12 wherein said preservative is selected from the group consisting of a salt, powdered dandelion root, echinacea, clove powder and mixtures thereof.

19. The snuff composition of claim 12 wherein said binder is selected from the group consisting of molasses, corn syrup, hydrogenated starch hydrolysates and mixtures thereof.

20. The snuff composition of claim 12 wherein said humectant is selected from the group consisting of glycerin, sorbitol, invert sugar, and other moisture-maintaining materials.

21. The snuff composition of claim 12 which further comprises a flavorant component, a color component, and an additional non-casing herbal binder component.

22. The snuff of claim 21 wherein said flavor component is present in an amount of from about 0.25% to about 7% by weight, said color component is present in an amount of from about 0.25% to about 5% by weight, and said additional binder component is present in an amount of from about 0.5% to about 5% by weight.

23. The snuff composition of claim 22 wherein said flavor component is present in an amount of from about 1.2% to about 5% by weight, said color component is present in an amount of from about 0.8% to about 3% by weight, and said additional binder component is present in an amount of from about 0.8% to about 3% by weight.

24. The snuff composition of claim 23 wherein said flavor component is present in an amount of from about 2.5% to about 4% by weight, said color component is present in an amount of from about 1.0% to about 1.8% by weight, and said additional binder component is present in an amount of from about 0.1% to about 2.0% by weight.

25. The snuff composition of claim 21 wherein said herbal binder component comprises an ingredient selected from the group consisting of gums, slippery elm, mallow, and mixtures thereof.

26. The process of claim 25 wherein said final moisture level is from about 19% to about 21%.

27. The snuff composition of claim 21 wherein said flavor component is selected from the group consisting of natural and artificial sweeteners, flavor agents, fruit flavors, spices, and mixtures thereof.

2026230589

[54] AEROSOL DEVICE

[75] Inventors: David C. Byram; Gerald W. Teiken;
Ralph D. Whaley, all of St. Paul,
Minn.

[73] Assignee: Minnesota Mining and
Manufacturing Company, St. Paul,
Minn.

[21] Appl. No.: 193,420

[22] Filed: May 12, 1988

[51] Int. Cl.⁴ A61M 11/00; A61M 11/04

[52] U.S. Cl. 128/200.23; 128/200.14;
222/162; 222/402.11; 222/402.12; 222/402.13

[58] Field of Search 128/200.14, 200.23;
222/162, 402.11, 402.12, 402.13

[56] References Cited

U.S. PATENT DOCUMENTS

3,001,524 9/1961 Maison et al. .
3,191,867 6/1965 Helms 128/200.23
3,506,004 4/1970 Mann et al. 222/402.13
3,636,949 1/1972 Kropp 128/200.23
3,732,864 5/1973 Thompson et al. .

3,789,843 2/1974 Armstrong et al. 128/200.23
4,292,966 10/1981 Mono et al. .
4,637,528 1/1987 Washimski et al. .
4,664,107 5/1987 Wass et al. .
4,678,106 7/1987 Newell et al. .
4,765,515 8/1988 Lippman 222/162
4,771,769 9/1988 Hegemann et al. 222/162

OTHER PUBLICATIONS

Physicians' Desk Reference 1988, 42, pp. 1872-1873.

Primary Examiner—Edgar S. Burr

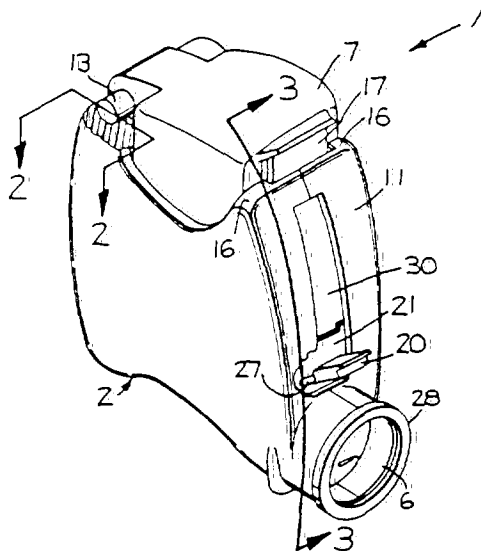
Assistant Examiner—Kimberly L. Asher

Attorney, Agent, or Firm—Donald M. Sell; Walter N.
Kim; Robert W. Sprague

[57] ABSTRACT

The invention is a dispenser for use with aerosol formulations for inhalation therapy. The dispenser is small, conveniently carried, and features means to prevent unintended actuation of the aerosol canister and means to prevent dust and dirt from entering the dispenser during storage.

18 Claims, 3 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

JUL 24 1989

NOTED none

2026230590

United States Patent [19]

Hurka et al.

[11] Patent Number: 4,841,964

[45] Date of Patent: Jun. 27, 1989

[54] INHALER

[76] Inventors: Wilhelm Hurka, Am Pfarrfeld 1,
A9851 Lieserbrücke, Austria; Rudolf
A. Hatschek, 3, rue Jacques-Vogt,
Fribourg 5, Switzerland, CH-1700

[21] Appl. No.: 892,197

[22] Filed: Jul. 31, 1986

[30] Foreign Application Priority Data

Aug. 1, 1985 [AT] Austria 2272/85

[51] Int. Cl.⁴ A61M 16/00

[52] U.S. Cl. 128/203.15; 128/203.23;
604/58

[58] Field of Search 128/203.15, 203.23;
604/57, 58; 222/224

[56] References Cited

U.S. PATENT DOCUMENTS

2,534,636 12/1950 Stirn 128/203.15
2,816,549 12/1957 Webster 128/203.15
3,809,084 5/1974 Hansen 128/203.15

Primary Examiner—Edward M. Coven

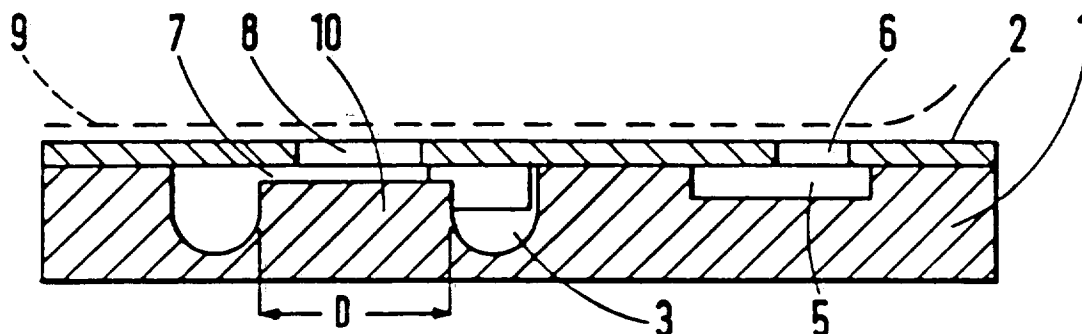
Assistant Examiner—K. M. Reichle

Attorney, Agent, or Firm—Kurt Kelman

[57] ABSTRACT

An inhaler is described for introducing a solid substance in particulate form into the inhaled air of a user. The inhaler comprises a body in which is provided an endless orbital path 3 for one or more balls 4. Air enters the path via an air inlet optionally through an intake conduit. Air leaves the orbital path 3 in a centripetal direction through an air discharge system and an air outlet. The solid substance to be inhaled is provided, preferably in the form of a film, on the surface of the orbital path or on the surface of the ball. A user inhales through the air outlet 8, and this causes air to be drawn into the orbital path through the air inlet. This causes the ball to circulate around the orbital path, in which process solid substance is dislodged and caused to flow with the air out through the outlet.

16 Claims, 4 Drawing Sheets



RECEIVED
PHILIP MORRIS MANUFACTURING CORP.
LAW DEPT.—PATENT SECTION

MAR 14 1990

NOTED _____

2026230591

United States Patent [19]
Tran

[11] Patent Number: 4,842,598
[45] Date of Patent: Jun. 27, 1989

[54] THERAPEUTIC AGENT DELIVERY SYSTEM
AND METHOD

- [75] Inventor: Loi H. Tran, Wheaton, Ill.
[73] Assignee: Controlled Release Technologies,
Inc., Batavia, Ill.
[21] Appl. No.: 137,761
[22] Filed: Dec. 24, 1987

Related U.S. Application Data

- [62] Division of Ser. No. 679,128, Dec. 6, 1984, Pat. No.
4,715,850.
[51] Int. Cl.⁴ A61M 5/00
[52] U.S. Cl. 604/891.1; 604/131;
204/130
[58] Field of Search 604/82, 83, 86, 87,
604/93, 126, 891.1, 131; 204/130, 131

[56] References Cited

U.S. PATENT DOCUMENTS

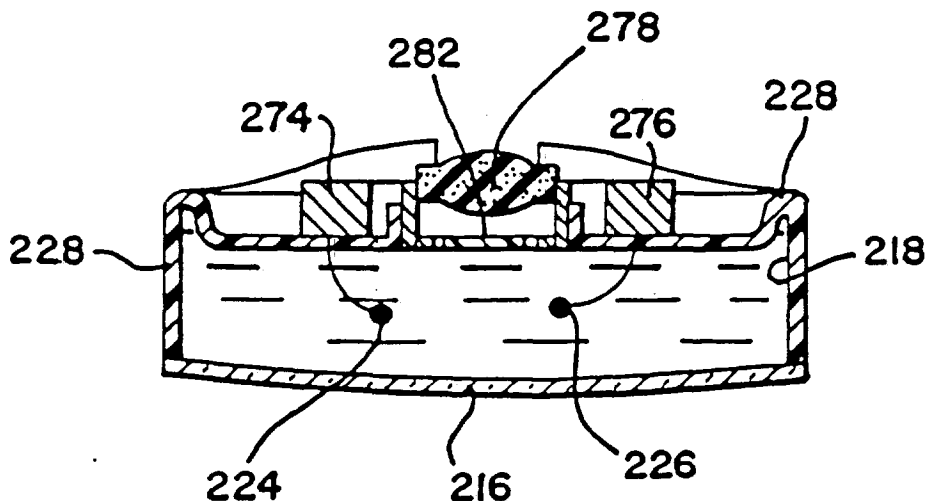
- 4,140,121 2/1979 Kuhl et al. 604/891.1
4,436,094 3/1984 Cerami 128/635
4,540,403 9/1985 Theeuwes 604/85
4,639,244 1/1987 Rizk et al. 604/891.1

Primary Examiner—Stephen C. Pellegrino
Attorney, Agent, or Firm—Olson & Hierl

[57] ABSTRACT

A method and apparatus for controllably administering a therapeutic agent to a patient is disclosed. The method and apparatus uses an electromotive force between an anode and a cathode to cause the therapeutic agent to migrate through a semipermeable membrane. The therapeutic agent is then delivered to the patient.

6 Claims, 5 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT-PATENT SECTION

MAR 14 1990

NOTED _____

2026230592

United States Patent [19]

Sperry

[11] Patent Number: 4,852,561

[45] Date of Patent: Aug. 1, 1989

[54] INHALATION DEVICE

[76] Inventor: Charles R. Sperry, 113 Clinton St.,
Springfield, Vt. 05156

[21] Appl. No.: 224,883

[22] Filed: Jul. 27, 1988

[51] Int. Cl.⁴ A61M 15/00

[52] U.S. Cl. 128/200.23; 128/203.15;
128/200.18

[58] Field of Search 128/200.23, 200.18,
128/203.15, 203.23, 203.13, 203.12

[56] References Cited

U.S. PATENT DOCUMENTS

3,560,070	2/1971	Hanson et al.	128/173
3,732,864	5/1973	Thompson et al.	128/173 R
3,814,297	6/1974	Warren	222/402.13
3,826,413	7/1974	Warren	222/402.13
4,414,972	11/1983	Young et al.	128/200.23
4,470,412	9/1984	Nowacki et al.	128/200.18
4,484,577	11/1984	Sackner et al.	128/203.28
4,534,343	8/1985	Nowacki et al.	128/200.23
4,570,630	2/1986	Elliott et al.	128/203.15
4,952,348	6/1986	Waters, IV et al.	128/200.23

FOREIGN PATENT DOCUMENTS

699313 12/1964 Canada 128/200.18
8502778 7/1985 World Int. Prop. O. 128/203.15

Primary Examiner—Edgar S. Burr

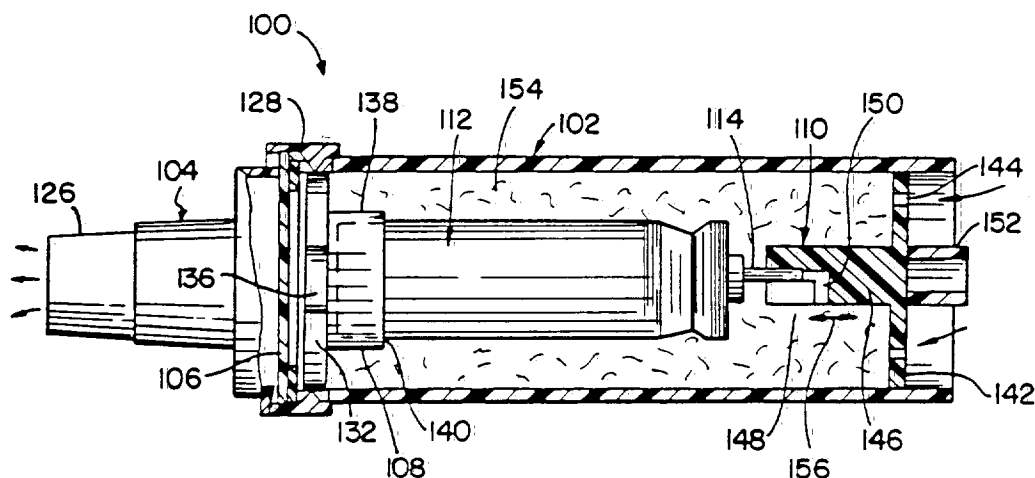
Assistant Examiner—Kimberly L. Asher

Attorney, Agent, or Firm—Lerner, David, Littenberg,
Krumholz & Mentlik

[57] ABSTRACT

An inhalation device in the nature of a metered dose inhaler is designed specifically for existing respiratory drugs to be employed in hospitals and/or by patients at home. The device is constructed of a housing which defines an aerosol chamber for a metered dose of a medicant containing aerosol from a cartridge. The cartridge is supported wholly within the aerosol chamber. An actuating valve mechanism is slidably receiving within an open end of the housing and includes a projecting portion to which a compressive force may be applied. Upon application of the compressive force, for example, by forcing the open end of the housing against a supporting surface, the outlet valve mechanism of the cartridge is activated to dispense a metered dose of medicant into the aerosol chamber in the form of an aerosol.

26 Claims, 3 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT-PATENT SECTION

NOV - 8 1989

2 NOTED

each file - Thompson

2026230593

United States Patent [19]

Tamaoki et al.

[11] Patent Number: 4,865,056

[45] Date of Patent: Sep. 12, 1989

[54] EASILY BREAKABLE PLASTIC CAPSULE
AND A WATER FILTER FOR A CIGARETTE
USING THE SAME

[75] Inventors: Akimichi Tamaoki; Shinichiro
Tanaka; Morio Kondo, all of
Yokohama; Masami Kawata, Tokyo;
Ichiro Hirose, Tokyo; Hiroshi
Uematsu, Tokyo; Kazuto Minami,
Yokohama; Mitsuyuki Kobiyama,
Matsudo, all of Japan

[73] Assignees: Japan Tobacco Inc.; DAI Nippon
Printing Co., Ltd., both of Tokyo,
Japan

[21] Appl. No.: 145,283

[22] Filed: Jan. 19, 1988

[30] Foreign Application Priority Data

Jan. 23, 1987 [JP] Japan 62-12518
May 6, 1987 [JP] Japan 62-108894

[51] Int. Cl.⁴ A24D 3/06; B65D 41/02

[52] U.S. Cl. 131/337; 131/173;
220/265; 220/207

[58] Field of Search 131/173, 335, 337;
220/207, 359, 265, 266, 89 R, 89 A; 222/541,
107, 95; 401/132

[56] References Cited

U.S. PATENT DOCUMENTS

2,755,206 7/1956 Statia 131/337
3,502,084 3/1970 Carty 131/337
3,575,180 4/1971 Carty 131/337
3,602,235 8/1971 Dock 131/337
3,884,246 5/1975 Walker 131/337
3,991,773 11/1976 Walker 131/337

FOREIGN PATENT DOCUMENTS

62-22583 1/1987 Japan

Primary Examiner—V. Millin

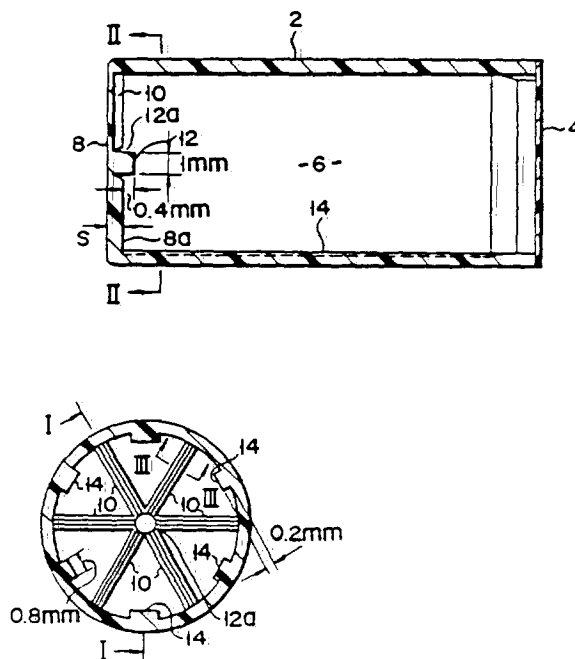
Assistant Examiner—J. Welsh

Attorney, Agent, or Firm—Nixon & Vanderhye

[57] ABSTRACT

An easily breakable plastic capsule according to the present invention comprises a hollow cylindrical body capable of elastic deformation. The body is packed with a fluid material. An end wall of the body is formed with a plurality of radially extending grooves. When the body is deformed elastically, the bottom walls of the grooves are broken, so that the material flows out of the body through tears in the grooves. A water filter according to the present invention comprises a casing, made of paper and coupled to a cigarette, and a filter member and the capsule arranged in the casing. The grooved end wall of the capsule is situated in close vicinity to the filter member.

25 Claims, 4 Drawing Sheets



NOV 23 1989

✓ Gus K

2 NOTED ✓ Dem S

✓ F14 08 I

2026230594

[54] ULTRASONIC POCKET ATOMIZER

[75] Inventors: Wolf-Dietrich Drews, Lichtenfels;
Klaus Van Der Linden, Kronach;
Martin Rüttel, Grub a. Forst; Jürgen
Friedrich, Neuensorg, all of Fed.
Rep. of Germany

[73] Assignee: Siemens Aktiengesellschaft, Munich,
Fed. Rep. of Germany

[21] Appl. No.: 296,846

[22] Filed: Jan. 12, 1989

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 84,413, Aug. 10, 1987,
abandoned.

[30] Foreign Application Priority Data

Aug. 11, 1986 [DE] Fed. Rep. of Germany 3627222

[51] Int. Cl.⁴ H01L 41/08

[52] U.S. Cl. 310/323; 310/317;
128/200.16; 239/102.2

[58] Field of Search 310/321-325,
310/317; 239/102.2; 128/200.14, 200.16

[56] References Cited

U.S. PATENT DOCUMENTS

3,387,607 6/1968 Gauthier et al. 310/323 X
3,561,444 2/1971 Boucher 128/200.16
3,828,773 8/1974 Buch et al. 310/317 X
3,989,042 11/1976 Mitsui et al. 239/102.2 X
4,109,863 8/1978 Olson et al. 239/102.2
4,294,407 10/1981 Reichl et al. 128/200.16 X
4,334,531 6/1982 Reichl et al. 128/200.14
4,583,056 4/1986 Takeda et al. 310/317 X
4,718,421 1/1988 Rohwedder et al. 310/325 X

4,757,227 7/1988 Danley et al. 310/323

FOREIGN PATENT DOCUMENTS

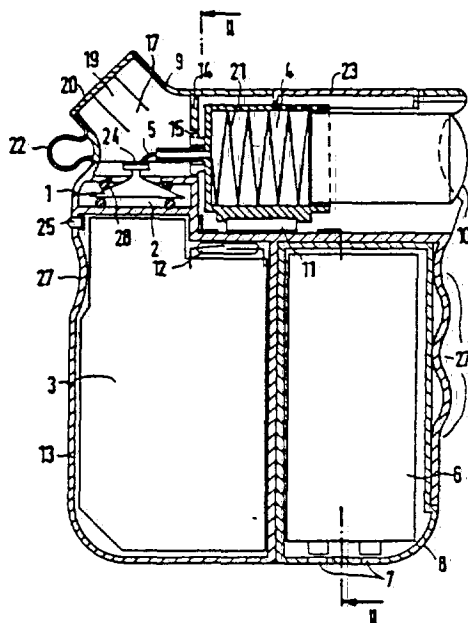
2557958 6/1977 Fed. Rep. of Germany
2101500 1/1983 United Kingdom 128/200.16

Primary Examiner—Mark O. Budd
Attorney, Agent, or Firm—Kenyon & Kenyon

[57] ABSTRACT

An ultrasonic pocket-size atomizer comprises a housing including a first portion and a second portion detachably connected thereto. A vibration generation mechanism is mounted liquid-tight in the first portion of the housing for generating an oscillation with a frequency between 1 and 5 Mhz. The vibration generation mechanism includes a piezoelectric assembly and an electronic circuit operatively connected to the assembly for energizing the assembly and causing the assembly to vibrate. A power source including a storage battery is removably and rechargeably disposed in the first portion of the housing for supplying electric current to the electronic circuit. A cartridge is provided for containing liquid to be atomized, the cartridge being movably disposed in the second portion of the housing. An activation mechanism is provided for automatically activating the electronic circuit upon motion of the movable section of the cartridge, the activation mechanism including a magnet attached to the movable section of the cartridge so as to move therewith. The activation mechanism further includes a switch operatively connected to the electronic circuit and operable by the magnet upon a shift in the position thereof during motion of the movable section of the cartridge.

18 Claims, 3 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

JAN 22 1990

NOTED UTSCH ✓
F + N ✓

2026230595

United States Patent [19]

Daeges et al.

[11] Patent Number: 4,888,516

[45] Date of Patent: Dec. 19, 1989

[54] PIEZOELECTRICALLY EXCITABLE RESONANCE SYSTEM

[75] Inventors: Johannes Daeges, Lichtenfels; Klaus
Van Der Linden, Kronach, both of
Fed. Rep. of Germany

[73] Assignee: Siemens Aktiengesellschaft, Berlin &
Munich, Fed. Rep. of Germany

[21] Appl. No.: 222,266

[22] Filed: Jul. 21, 1988

[30] Foreign Application Priority Data

Jul. 22, 1987 [DE] Fed. Rep. of Germany 3724629

[51] Int. Cl.⁴ H01L 41/08

[52] U.S. Cl. 310/323; 239/102.2;
310/335

[58] Field of Search 310/321-323,
310/325, 328, 335, 336, 337, 369; 239/102.1,
102.2; 134/1

[56] References Cited

U.S. PATENT DOCUMENTS

3,904,896 9/1975 Guntersdorfer .

4,474,326 10/1984 Takahashi 310/325 X

FOREIGN PATENT DOCUMENTS

0019210 7/1980 European Pat. Off. 310/335

1425897 10/1964 Fed. Rep. of Germany 310/323

2557958 6/1977 Fed. Rep. of Germany 310/323

3616713 5/1986 Fed. Rep. of Germany .

434623 11/1974 U.S.S.R. 310/369

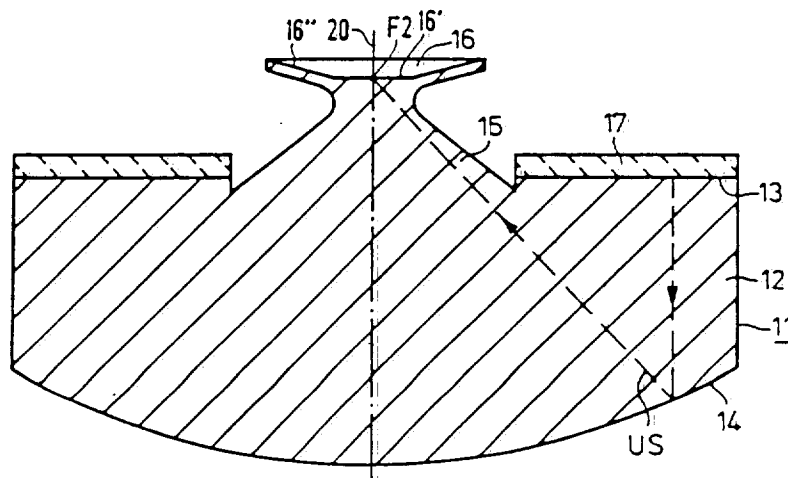
Primary Examiner—Mark O. Budd

Attorney, Agent, or Firm—Kenyon & Kenyon

[57] ABSTRACT

For generating liquid droplets which may pass into the lungs of a person, a resonance system is used which contains a rotation-symmetrical metal body with a disc-shaped base plate, a working plate, a neck connecting the working plate to the base plate as well as a piezoceramic vibrator. The vibrator is coupled to the plane base surface which extends perpendicularly to the symmetry axis of the metal body. The base plate is also provided with a parabolic reflector surface. The center of the working plate is in the vicinity of the reflector focal point, optionally mirrored with respect to the base area of the base plate, of the parabolic reflector surface. In this design, ultrasound waves excited by the vibrator are focused into the region of the working plate, thereby atomizing a liquid which is held by the working plate.

12 Claims, 1 Drawing Sheet



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
NEW YORK, N.Y. 10101

APR 9 1990

Handwritten signature

2026230596

United States Patent [19]

Wetterlin et al.

[11] Patent Number: 4,907,583

[45] Date of Patent: Mar. 13, 1990

- [54] DEVICE IN POWDER INHALATORS
- [75] Inventors: Kjell I. L. Wetterlin, S Sandby,
Sweden; Risto Virtanen, Nurmijärvi,
Finland; Jan A. R. Andersson, S
Sandby, Sweden
- [73] Assignee: Aktiebolaget Draco, Lund, Sweden
- [21] Appl. No.: 287,611
- [22] Filed: Dec. 16, 1988

Related U.S. Application Data

- [63] Continuation of Ser. No. 19,057, Feb. 26, 1987, abandoned.

Foreign Application Priority Data

Mar. 7, 1986 [SE] Sweden 86010600

- [51] Int. Cl.⁴ A61M 15/00
- [52] U.S. Cl. 128/203.15; 128/203.12;
128/200.18
- [58] Field of Search 128/200.18, 200.21,
128/203.12, 203.15, 203.22-203.24, 204.13;
239/461, 467, 487, 489, 500-501, 518-519;
222/345, 349

References Cited

U.S. PATENT DOCUMENTS

- 1,309,597 7/1919 Parker 239/489
- 1,431,177 10/1922 Palmer 128/203.22
- 2,604,094 7/1952 Miller et al. 128/203.15
- 2,674,999 4/1954 Cox
- 2,804,341 8/1957 Bete 239/501
- 4,014,470 3/1977 Burnham 239/487 X

- 4,147,166 4/1979 Hansen 128/203.15
- 4,353,365 10/1982 Hallworth et al. 128/203.15
- 4,446,862 5/1984 Baum et al. 128/203.15
- 4,524,769 6/1985 Wetterlin 128/203.15
- 4,570,630 2/1986 Elliott et al. 128/203.15

FOREIGN PATENT DOCUMENTS

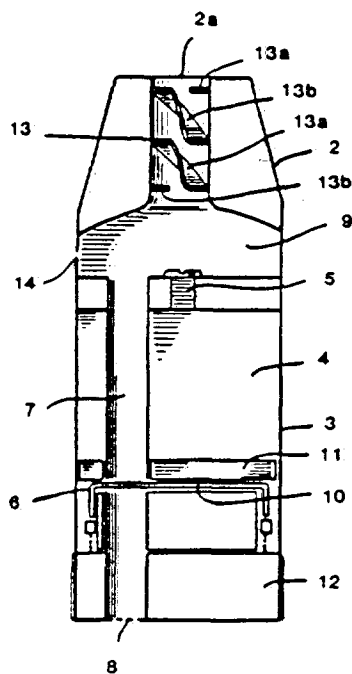
- 2152819 8/1985 United Kingdom 128/203.15

Primary Examiner—Angela D. Sykes
Attorney, Agent, or Firm—White & Case

[57] ABSTRACT

Device in a previously known powder inhalator intended for inhalation of an air flow which contains pharmacologically active compound in micronized form. The powder inhalator comprises a nozzle unit (2) with a nozzle aperture (2a) as well as a container unit (3) with a releasing or dosing unit (6) for delivering the active compound. The air flow generated by inhalation is at least partly aspirated through an air conduit (7) located in the container unit (3), which conduit extends from an air inlet (8), communicating with the environment, via said releasing or dosing unit (6), up to said nozzle unit (2). According to the invention, deflector devices are stationarily arranged in the container unit (3) and/or in the nozzle unit (2), said deflector devices, for example in the shape of a helical channel portion (13), being arranged to create a powerful deflecting movement for the purpose of disrupting said powder particles into the respirable particle size distribution (less than 5 μm).

10 Claims, 5 Drawing Sheets



RECEIVED
APR 19 1990
NOTED: _____

2026230597

United States Patent [19]

Ray et al.

[11] Patent Number: 4,907,605

[45] Date of Patent: Mar. 13, 1990

[54] ORAL TABACCO SUBSTITUTE

[75] Inventors: Jon P. Ray; Michael P. Ellis, both of
San Antonio, Tex.

[73] Assignee: Advanced Tobacco Products, Inc.,
San Antonio, Tex.

[21] Appl. No.: 303,036

[22] Filed: Jan. 25, 1989

Related U.S. Application Data

[63] Continuation of Ser. No. 771,246, Aug. 30, 1985, abandoned, which is a continuation-in-part of Ser. No. 738,120, May 24, 1985, abandoned.

[51] Int. Cl.⁴ A24B 47/00

[52] U.S. Cl. 131;270; 131/273;
131/355

[58] Field of Search 131/270, 335, 359, 369

[56] References Cited

U.S. PATENT DOCUMENTS

2,860,638 11/1958 Bartolomeo .
3,200,819 8/1965 Gilbert .
3,422,819 1/1969 Jones et al. 131/335
3,521,643 7/1970 Toth .

3,603,319 9/1971 Badgett .
3,757,798 9/1973 Lambert .
3,877,468 4/1975 Lichtneckert et al. 131/270
3,952,741 4/1976 Baker .
4,189,511 2/1980 Levers et al. .
4,284,089 8/1981 Ray .
4,635,651 1/1987 Jacobs 131/329

Primary Examiner—V. Millin

Attorney, Agent, or Firm—Arnold, White & Durkee

[57] ABSTRACT

An oral nicotine dispenser comprising nicotine or a nicotine salt and a water-insoluble material capable of sorbing nicotine. The dispenser is able to slowly release the sorbed nicotine or nicotine salt in an oral environment. The water insoluble material may consist essentially of paper or a polymeric substance able to absorptively contain nicotine.

The water-insoluble material may be a substance such as paper or cellulose acetate. A water-insoluble polymeric substance such as a polyolefin, most preferably polyethylene or polypropylene may be used as the nicotine-holding material.

4 Claims, No Drawings

RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.-PATENT SECTION

JUN 11 1990

NOTED

B. Hardy

2026230598

United States Patent [19]

Lilja et al.

[11] Patent Number: 4,907,606

[45] Date of Patent: Mar. 13, 1990

[54] TOBACCO COMPOSITIONS, METHOD AND DEVICE FOR RELEASING ESSENTIALLY PURE NICOTINE

[75] Inventors: Jan E. Lilja, Kristianstad; Sven E. L. Nilsson, Helsingborg, both of Sweden

[73] Assignee: AB Leo, Helsingborg, Sweden

[21] Appl. No.: 148,701

[22] Filed: Jan. 26, 1988

Related U.S. Application Data

[62] Division of Ser. No. 882,929, filed as PCT SE85/00424 on Oct. 29, 1985, published as WO86/02528 on May 9, 1986, Pat. No. 4,776,353.

Foreign Application Priority Data

Nov. 1, 1984 [SE] Sweden 8405479

[51] Int. Cl.⁴ A24D 1/00; A24F 1/00

[52] U.S. Cl. 131/273; 131/194

[58] Field of Search 131/330, 329, 273, 270, 131/194, 198.1, 360

References Cited

U.S. PATENT DOCUMENTS

2,104,266 1/1938 McCormick 131/330
2,972,557 2/1961 Toulmin, Jr. ...

3,292,636 12/1966 Mays .
4,141,369 2/1979 Burruss .
4,149,548 4/1979 Bradshaw 131/273
4,219,032 8/1980 Tabatznik et al. .
4,284,089 8/1981 Ray .
4,303,083 12/1981 Burruss, Jr. .
4,340,072 7/1982 Bolt .
4,474,191 10/1984 Steiner 131/198.1
4,735,217 4/1988 Garth .

FOREIGN PATENT DOCUMENTS

0155514 2/1985 European Pat. Off. .
116941 1/1900 Fed. Rep. of Germany .
2099824 3/1972 France .
1116644 6/1968 United Kingdom .
1185887 3/1970 United Kingdom 131/360
1316987 5/1973 United Kingdom .

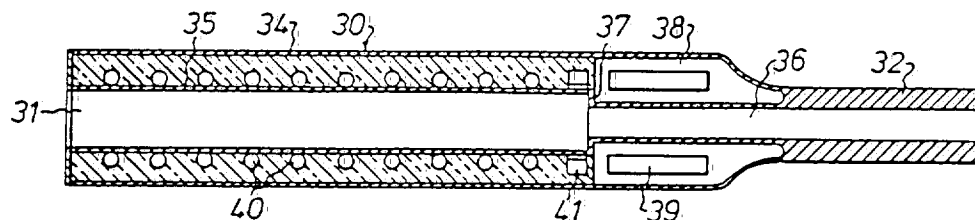
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Gordon W. Hueschen

[57] ABSTRACT

Novel tobacco compositions which when subjected to an elevated temperature below the combustion temperature the tobacco liberates essentially pure nicotine. The invention also includes a method for liberating nicotine from the compositions and a device for carrying out the method.

9 Claims, 2 Drawing Sheets



(Division of earlier patent)

2026230599

United States Patent [19]
Govil et al.

[11] Patent Number: 4,908,213
[45] Date of Patent: Mar. 13, 1990

[54] TRANSDERMAL DELIVERY OF NICOTINE

[75] Inventors: Sharad K. Govil, Plantation; Paul Kohlman, Deerfield Beach, both of Fla.

[73] Assignee: Schering Corporation, Kenilworth, N.J.

[21] Appl. No.: 313,103

[22] Filed: Feb. 21, 1989

[51] Int. Cl.⁴ A61L 15/00; A61B 5/00

[52] U.S. Cl. 424/447; 424/449; 128/156

[58] Field of Search 424/422-426, 424/447, 448, 449; 128/156

[56] References Cited

U.S. PATENT DOCUMENTS

4,597,961 7/1986 Etscorn 424/448
4,839,174 6/1989 Baker et al. 424/447

FOREIGN PATENT DOCUMENTS

3438284 3/1985 Fed. Rep. of Germany
8801516 3/1988 PCT Int'l Appl.

OTHER PUBLICATIONS

Rose, et al., *Clin. Pharmacol. Ther.*, 38, 4, (1985), pp. 450-456.

CA102:1911882 (1985).

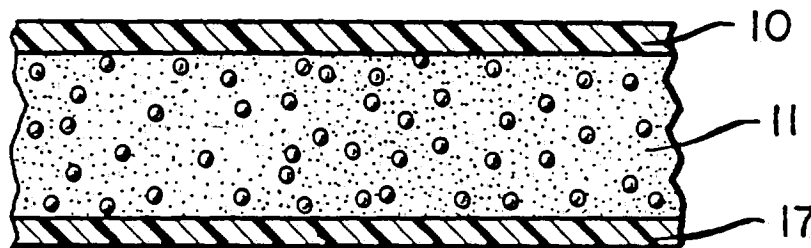
Primary Examiner—Nancy A. B. Swisher

Attorney, Agent, or Firm—Anita W. Magatti; James R. Nelson; Stephen I. Miller

[57] ABSTRACT

A transdermal nicotine patch comprising an antipruritic to counteract pruritis observed with the transdermal administration of nicotine is disclosed. The patch can be any conventional patch type, e.g., reservoir, adhesive or polymeric matrix.

14 Claims, 1 Drawing Sheet



RECEIVED
FEDERAL BUREAU OF INVESTIGATION
U.S. DEPARTMENT OF JUSTICE

APR 19 1990

NOTED: _____

2026230600

United States Patent [19]

Vromen et al.

[11] Patent Number: 4,911,181

[45] Date of Patent: Mar. 27, 1990

[54] PLASTIC MOUTHPIECE FOR SIMULATED SMOKING

[75] Inventors: Zwi Vromen, Tel Aviv; Joseph Gross, Moshav Mazor, both of Israel

[73] Assignee: Inventor's Funding Company, Ltd., Tel Aviv, Israel

[21] Appl. No.: 222,534

[22] Filed: Jul. 21, 1988

[30] Foreign Application Priority Data

Sep. 8, 1987 [IL] Israel 83826

[51] Int. Cl.⁴ A24F 47/00

[52] U.S. Cl. 131/273; 131/270

[58] Field of Search 128/200.23; 202.21, 128/760, 765; 131/270, 271, 272, 273; 604/133, 135, 142, 146

[56] References Cited

U.S. PATENT DOCUMENTS

2,860,638	11/1958	Bartolomeo .	
3,320,953	5/1967	Rindner .	
3,340,869	9/1967	Bane	128/765
3,347,231	10/1967	Chang .	
3,365,102	1/1968	Castleberry .	
3,587,573	6/1971	Flack .	
3,710,804	1/1973	Wey .	
4,083,372	4/1978	Boden .	
4,171,000	10/1979	Uhle .	
4,284,089	8/1981	Ray .	
4,296,071	10/1981	Weiss et al.	128/765
4,393,884	7/1983	Jacobs	131/273
4,429,703	2/1984	Haber	131/273
4,539,985	9/1985	Magrath	604/133 X
4,569,136	2/1986	Loring	131/273
4,655,294	4/1987	Sensabaugh	131/273

FOREIGN PATENT DOCUMENTS

1398033	3/1965	France	131/270
2601563	1/1988	France .	
148789	5/1965	Netherlands .	
2089188	6/1982	United Kingdom .	

Primary Examiner—V. Millin

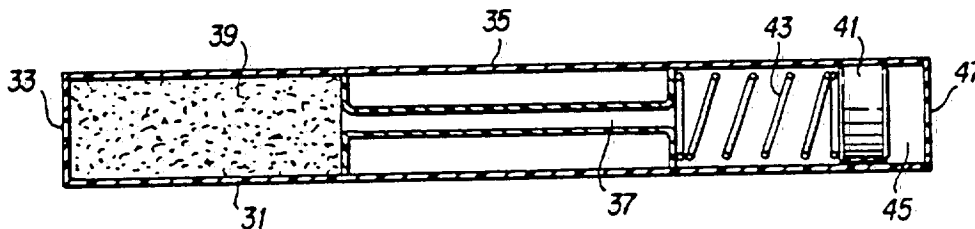
Assistant Examiner—D. F. Crosby

Attorney, Agent, or Firm—Oblon, Spivak, McClelland, Maier & Neustadt

[57] ABSTRACT

The invention includes a cigarette like device which enables the user to experience the taste and aroma as well as the tactile sensations of smoking a tobacco cigarette—but without the presence of smoke, without any combustion, and without inhalation of harmful carcinogenic substances (e.g. tars) into the user's lungs. The device consists of a plastic mouthpiece containing a plug of chewing tobacco connected to a plastic tube with an axial duct, extending to a sealed end, where there is located a pumping member in the form of a flexible accordion-like, or bellows-type configuration or a spring-loaded ball or position. In a further embodiment, the device consists of a conventional mouthtip filter, or a tubular body with a flexible collapsible side wall sealed at the far end, and a tobacco insert. In the device, repeated suction cycles by the user are utilized to initially draw the user's saliva through the tobacco insert to flavor it with nicotine, and then to recirculate this saliva back to the user's mouth on successive suction cycles, allowing the user to taste and smell the nicotine. Inserts other than tobacco can be used in the device (e.g. menthol, various medications and the like).

11 Claims, 2 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

APR 17 1990

NOTED *[Signature]*
[Signature]

2026230601

United States Patent [19]

Potter et al.

[11] Patent Number: 4,913,168

[45] Date of Patent: Apr. 3, 1990

[54] FLAVOR DELIVERY ARTICLE

[75] Inventors: Dennis L. Potter, Kernersville; Mark L. Raker, Clemmons; Henry T. Ridings, Lewisville; Andrew J. Sensabaugh, Jr., Winston-Salem; Amos E. Westmoreland, Winston-Salem; Donna K. Woods, Winston-Salem; Chandra K. Banerjee, Pfafftown, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 278,060

[22] Filed: Nov. 30, 1988

[51] Int. Cl.⁴ A24F 1/00

[52] U.S. Cl. 131/194; 131/273; 131/360

[58] Field of Search 131/273, 194-197

[56] References Cited

U.S. PATENT DOCUMENTS

2,104,266 1/1938 McCormick 131/12
3,258,015 6/1966 Ellis et al. 131/171
3,683,936 8/1972 O'Neil, Jr. 131/8
3,766,079 10/1973 Jackman 252/188.3 R
3,875,083 4/1975 Murtaugh 252/535
3,924,603 12/1975 Chapin 126/263
3,968,048 7/1976 Bolan 252/157
4,058,474 11/1977 Keyes et al. 252/160

4,067,313 1/1978 Donnelly 126/263
4,079,742 3/1978 Rainer et al. 131/2
4,149,548 4/1979 Bradshaw 131/273
4,206,068 6/1980 Davis 252/89.1
4,284,089 8/1981 Ray 131/270
4,338,098 7/1982 Yamaji 44/3 A
4,393,884 7/1983 Jacobs 131/273
4,574,051 3/1986 Matthews et al. 252/70
4,774,971 10/1988 Vieten 131/273

FOREIGN PATENT DOCUMENTS

276250 6/1967 Australia
8602528 5/1986 PCT Int'l Appl.

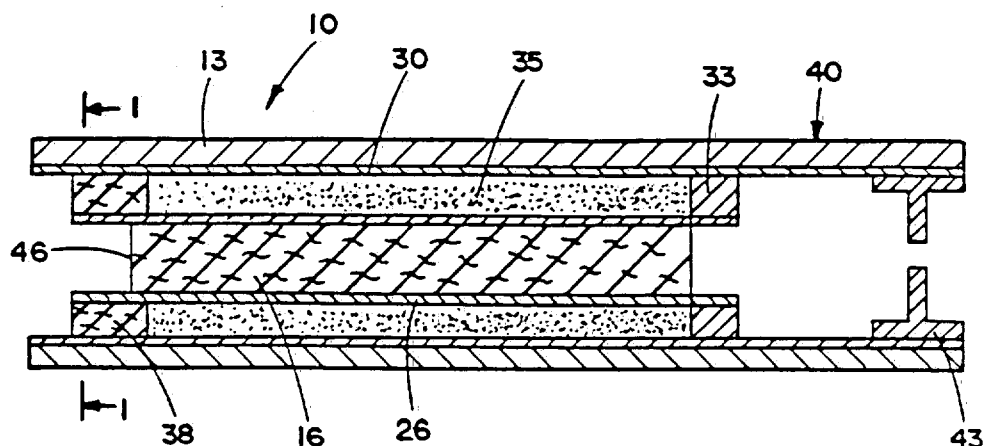
Primary Examiner—V. Millin

Assistant Examiner—Jennifer L. Doyle

[57] ABSTRACT

A flavor delivery article provides volatilized flavor by heating a flavor carrying substrate, but not burning any material. A heat source which includes a metal oxide (e.g., calcium oxide), an anhydrous metal sulfate (e.g., magnesium sulfate), an inorganic salt and a sugar, generates heat upon contact of water therewith. The heat produced by the heat source heats flavor in a heat exchange relationship therewith. Flavors volatilize and are drawn into the mouth of the user of the article. Typical heat sources heat the flavor to a temperature within 70° C. to 200° C. for 4 to 8 minutes.

69 Claims, 1 Drawing Sheet



RECEIVED
OFFICE OF THE SECRETARY OF COMMERCE
U.S. DEPARTMENT OF COMMERCE

APR 19 1990

NOTED: *see Delta Group*

2026230602

[54] SMOKING ARTICLE

[75] Inventor: Leroi K. Templeton, Louisville, Ky.

[73] Assignee: Brown & Williamson Tobacco Corporation, Louisville, Ky.

[21] Appl. No.: 325,330

[22] Filed: Mar. 17, 1989

[51] Int. Cl.⁴ A24D 3/04

[52] U.S. Cl. 131/194; 131/359;
131/361; 131/364

[58] Field of Search 131/198 R, 198.1, 359,
131/361, 364, 194

[56] References Cited

U.S. PATENT DOCUMENTS

3,774,622 11/1973 Steigerwald 131/198.2

4,474,191 10/1984 Steiner 131/198.2

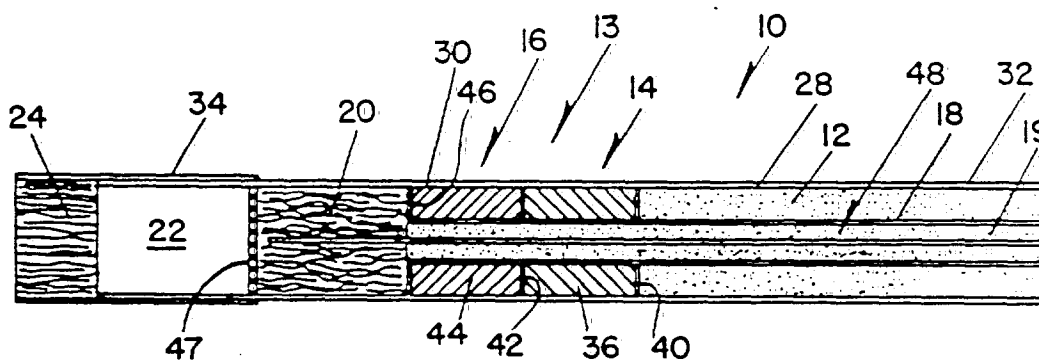
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A smoking article includes a fuel rod, an insulation section at one end of the fuel rod, a tobacco plug at the end of the insulation return, a cooling chamber at the end of the insulation section, and a filter at the end of the chamber. A tube extends concentrically through the fuel rod to the tobacco plug. The tube is filled with an air permeable substrate including an aerosol generating substance. A heat conducting strip extends concentrically in the substrate in the tube and into the tobacco plug.

17 Claims, 1 Drawing Sheet



RECEIVED
FEDERAL BUREAU OF INVESTIGATION
U.S. DEPARTMENT OF JUSTICE

APR 19 1990

NOTED

YES ✓
Schiff L.
Will Delta 61

2026230603

United States Patent [19]

Potter et al.

[11] Patent Number: 4,917,119

[45] Date of Patent: Apr. 17, 1990

[54] DRUG DELIVERY ARTICLE

[75] Inventors: Dennis L. Potter, Kernersville; Mark L. Raker, Clemmons; Henry T. Ridings, Lewisville; Andrew J. Sensabaugh, Jr., Winston-Salem; Amos E. Westmoreland, Winston-Salem; Donna K. Woods, Winston-Salem; Chandra K. Banerjee, Pfafftown, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 277,731

[22] Filed: Nov. 30, 1988

[51] Int. Cl.⁴ A61M 15/06

[52] U.S. Cl. 131/273; 131/194;
128/202.21; 128/203.15; 128/204.13;
128/200.14; 128/204.17

[58] Field of Search 131/273, 196, 194, 195,
131/197; 128/202.21, 203.12; 203.13, 203.15,
203.17, 203.26, 204.13, 200.14, 200.23, 200.24,
204.17.202.27

[56] References Cited

U.S. PATENT DOCUMENTS

2,104,266 1/1938 McCormick .
3,258,015 6/1966 Ellis et al. .
3,683,936 8/1972 O'Neil, Jr. .
3,766,079 10/1973 Jackman .
3,875,083 4/1975 Murtaugh .

3,924,603 12/1975 Chapin .
3,968,048 7/1976 Bolan .
4,058,474 11/1977 Keyes et al. .
4,067,313 1/1978 Donnelly .
4,079,742 3/1978 Rainer et al. .
4,149,548 4/1979 Bradshaw .
4,206,068 6/1980 Davis .
4,284,089 8/1981 Ray .
4,338,098 7/1982 Yamaji .
4,393,884 7/1983 Jacobs .
4,574,051 3/1986 Matthews et al. .
4,774,971 10/1988 Vieten .

FOREIGN PATENT DOCUMENTS

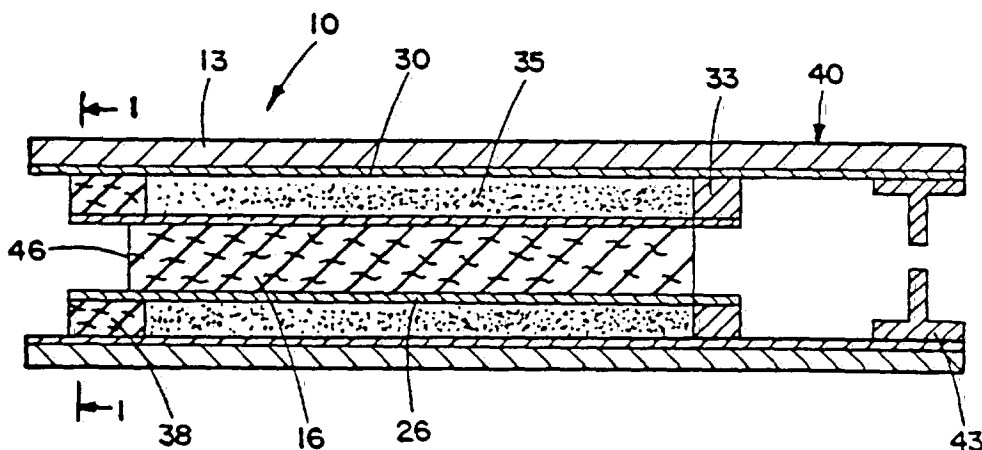
276250 6/1967 Australia .
8602528 5/1986 PCT Int'l Appl. .

Primary Examiner—V. Millin

[57] ABSTRACT

A drug delivery article provides a dose of a volatilized drug by heating a drug carrying substrate, but not burning any material. A heat source which includes a metal oxide (e.g., calcium oxide), an anhydrous metal sulfate (e.g., magnesium sulfate), an inorganic salt and a sugar, generates heat upon contact of water therewith. The heat produced by the heat source heats the drug in a heat exchange relationship therewith. The drug volatilizes and is drawn into the mouth of the user of the article. Typical heat sources heat the drug to a temperature within 70° C. to 200° C. for 4 to 8 minutes.

70 Claims, 1 Drawing Sheet



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

APR 26 1990

NOTED

2026230604

United States Patent [19]
Hill

[11] Patent Number: 4,917,120

[45] Date of Patent: Apr. 17, 1990

[54] NICOTINE IMPACT MODIFICATION

[75] Inventor: Ira D. Hill, Locust, N.J.

[73] Assignee: Advanced Tobacco Products, Inc.,
San Antonio, Tex.

[21] Appl. No.: 308,936

[22] Filed: Feb. 7, 1989

Related U.S. Application Data

[63] Continuation of Ser. No. 866,073, May 21, 1986, abandoned.

[51] Int. CL⁴ A24D 1/00; A24F 1/00

[52] U.S. CL 131/271; 131/273;
546/281

[58] Field of Search 131/270-271,
131/272, 273, 335; 546/281; 514/343

[56] References Cited

U.S. PATENT DOCUMENTS

1,776,862 9/1930 Lindstaedt .
2,139,839 12/1938 McKinney .
3,109,436 11/1963 Bavley et al. .
3,280,823 10/1966 Bavley et al. .

4,340,072 7/1982 Bolt et al. .

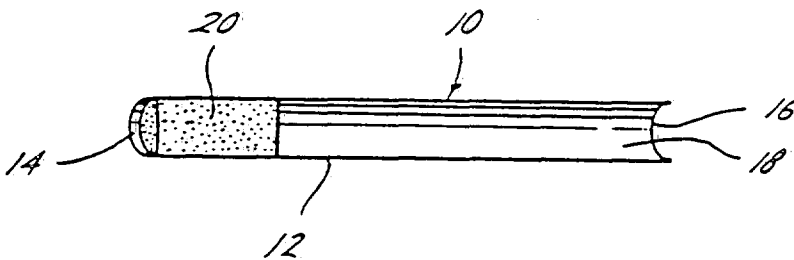
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Arnold, White & Durkee

[57] ABSTRACT

Compositions comprising nicotine and a volatile nicotine-miscible substance may be used to create sources of modulated nicotine vapor. The modulation of nicotine vapor may be one of quantity or of perceived physiological impact or a combination of both. The substance should have a volatility somewhat similar to that of nicotine and have a normal boiling point between about 175° C. and about 275° C. These compositions may be placed in the nicotine reservoir of a personal oral nicotine inhaler. Esters are preferred nicotine miscible substances, particularly when substantially flavorless and generally recognized as safe for human consumption. Nicotine and nicotine-miscible substance in a weight/weight ratio between about 0.5 and 40.0 are emplaced in a nicotine reservoir, for example absorbed in a porous polyethylene item, for insertion into the tubular passageway of a smokeless cigarette.

11 Claims, 2 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

APR 26 1990

NOTED
Cliff
Ted Sanders
J. Charles

2026230605

[54] SMOKING ARTICLE

[75] Inventors: Tilford F. Riehl; Robert R. Johnson,
both of Louisville, Ky.

[73] Assignee: Brown & Williamson Tobacco
Corporation, Louisville, Ky.

[21] Appl. No.: 281,583

[22] Filed: Dec. 9, 1988

[51] Int. Cl.⁴ A24B 15/28; A24D 1/18

[52] U.S. Cl. 131/364; 131/361;
131/360; 131/194

[58] Field of Search 131/364, 360, 361, 359,
131/369, 194

[56] References Cited

U.S. PATENT DOCUMENTS

2,979,058 4/1961 Schur 131/331
4,714,082 12/1987 Banerjee et al. 131/359

FOREIGN PATENT DOCUMENTS

1203172 10/1965 Fed. Rep. of Germany 131/331

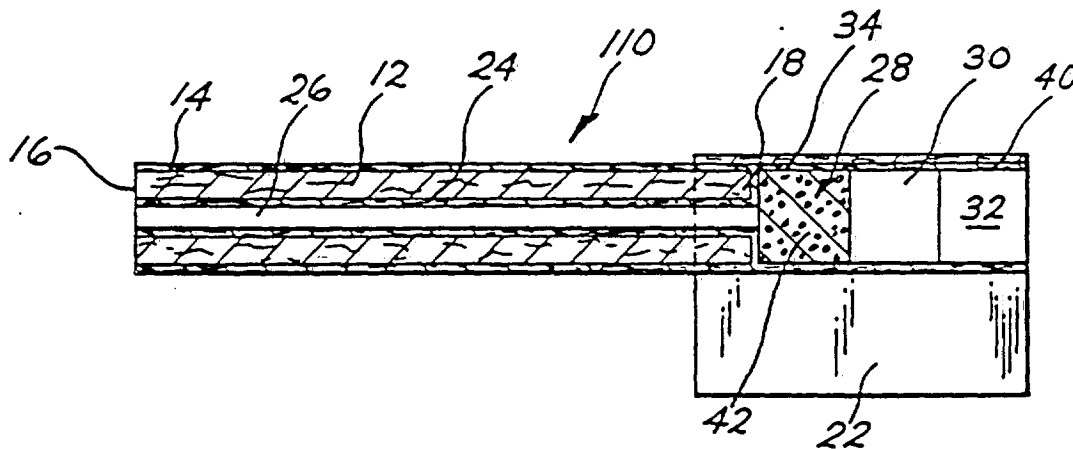
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A smoking article includes a tobacco column with a gas impermeable tube concentrically located in the tobacco column. The tube is filled with a granular material which is coated with an aerosolizing material. A first chamber is located at one end of the tobacco column with its inlet end in gas flow communication only with the tube, a tobacco rod is located with its inlet end at the discharge end of the first channel, and a second chamber is located in gas flow communication with the discharge end of the tobacco rod. The discharge end of the second chamber is open for discharging gas into the smoker's mouth.

9 Claims, 1 Drawing Sheet



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

APR 26 1990

Delta gr
Cliff
NOTED
JES

2026230606

United States Patent [19]

Rose et al.

[11] Patent Number: 4,920,989

[45] Date of Patent: May 1, 1990

[54] METHOD AND APPARATUS FOR AIDING
IN THE REDUCTION OF INCIDENCE OF
TOBACCO SMOKING

[75] Inventors: Jed E. Rose, Venice; Murray E.
Jarvik, Santa Monica; Karce D. Rose,
Healdsburg, all of Calif.

[73] Assignee: Regents of the University of
California, Alameda, Calif.

[21] Appl. No.: 157,536

[22] Filed: Feb. 19, 1988

Related U.S. Application Data

[62] Division of Ser. No. 727,525, Apr. 25, 1985.

[51] Int. Cl.⁵ A24F 47/00; A61K 9/00

[52] U.S. CL. 131/270

[58] Field of Search 514/314; 604/896, 897,
604/46; 131/270

[56] References Cited

U.S. PATENT DOCUMENTS

4,473,083	9/1984	Magania	604/46
4,579,858	4/1986	Ferno et al.	131/270
4,597,961	7/1986	Etscom	514/314
4,635,651	1/1987	Jacobs	131/220

FOREIGN PATENT DOCUMENTS

0930668	7/1973	Canada	604/897
---------	--------	--------	---------

OTHER PUBLICATIONS

Tobacco Alkaloids and Related Compounds edited by
Von Euler, pp. 3-13, A Pergamon Press Book, 1965.

"Bronchial Effects of Aerosolized $\Delta 9$ -Tetrahydrocon-
nol in Healthy and Asthmatic Subjects" by Tasbin et
al., *American Review of Respiratory Disease*, vol. 115,
1977.

"Drug Permeation through Human Skin: Theory and
In Vitro Experimental Measurement" by Chandraseka-
ran et al., *AICHE* (vol. 21, No. 5), Sep. 1975, pp.
985-993.

Primary Examiner—V. Millin

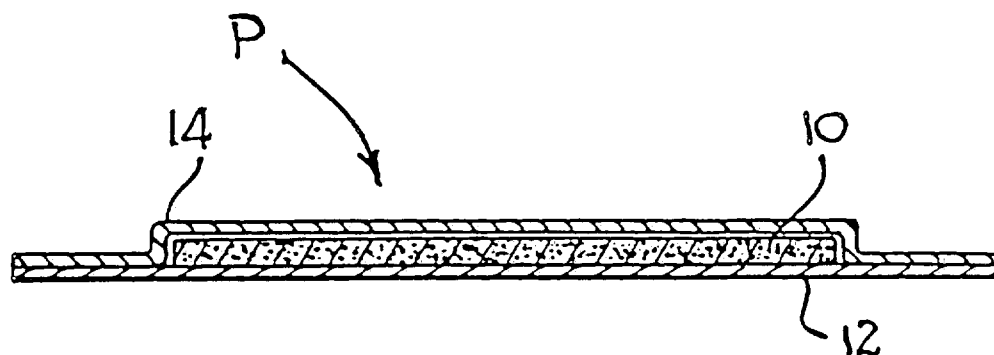
Assistant Examiner—J. L. Doyle

Attorney, Agent, or Firm—Robert J. Schaap

[57] ABSTRACT

A method of aiding in the reduction of incidence of
tobacco smoking. The method comprises applying a
patch containing nicotine to the skin of a person with
whom smoking reduction is desired and allowing the
nicotine to transdermally migrate into the person's
bloodstream to achieve a desired systemic nicotine
level. The method also comprises the simultaneous ad-
ministration of a nicotine containing aerosol spray to
the oral cavity of the user in order to provide the de-
sired sensations in the respiratory tract to which the
user is accustomed from normal tobacco smoke. A com-
bination of the spray and transdermal patch is also pro-
vided such that an occlusive patch is applied to the skin
of the person with whom smoking reduction is desired
and the nicotine containing aerosol spray is delivered to
the oral cavity simultaneously with the application of
the nicotine from the patch.

29 Claims, 3 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT. PATENT SECTION

MAY 7 - 1990

J. Charles

C. Ellis

United States Patent [19]

Sibalis

[11] Patent Number: 4,921,475

[45] Date of Patent: May 1, 1990

[54] TRANSDERMAL DRUG PATCH WITH
MICROTUBES

[75] Inventor: Dan Sibalis, Stony Brook, N.Y.

[73] Assignee: Drug Delivery Systems Inc., New
York, N.Y.

[21] Appl. No.: 196,664

[22] Filed: May 20, 1988

Related U.S. Application Data

[60] Division of Ser. No. 922,296, Oct. 23, 1986, abandoned,
which is a division of Ser. No. 839,050, Mar. 12, 1986,
Pat. No. 4,640,689, which is a continuation of Ser. No.
702,486, Feb. 19, 1985, abandoned, which is a contin-
uation-in-part of Ser. No. 660,192, Oct. 12, 1984, Pat. No.
4,622,031, which is a continuation-in-part of Ser. No.
524,252, Aug. 18, 1983, Pat. No. 4,557,723.

[51] Int. Cl.³ A61N 1/30

[52] U.S. Cl. 604/20; 128/798;
128/802; 128/640

[58] Field of Search 128/639, 640, 641, 798,
128/802, 803; 604/20

[56] References Cited

U.S. PATENT DOCUMENTS

4,325,367	4/1982	Tapper	604/20
4,406,658	9/1983	Lattin et al.	604/20
4,474,570	10/1984	Arivra et al.	604/20
4,640,689	2/1987	Sibalis	128/798

Primary Examiner—Max Hindenburg

Assistant Examiner—Randy Shay

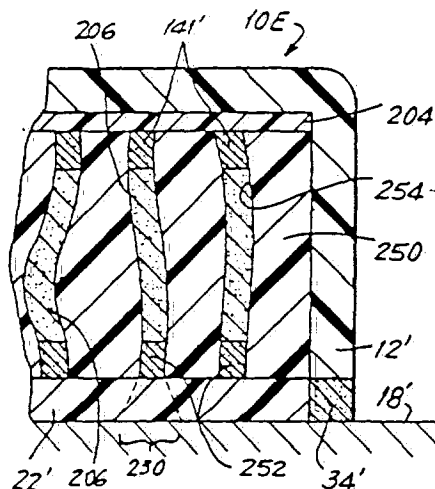
Attorney, Agent, or Firm—Lackebach Siegel Marullo &
Aronson

[57] ABSTRACT

A transdermal drug patch for delivering at least one
drug to a patient through the skin comprises:

- (a) at least two electrodes forming the patch and sepa-
rated from each other by an insulator;
- (b) a circuit including an electrical power source for
supplying power to and electrically connected to the
electrodes at a conductive element; and
- (c) drug reservoir means in the form of a plurality of
microtubes separated from and insulated from each
other extending from a conductive element at one
end to the surface of the patch interfacing with the
patient at the other end of the microtube.

20 Claims, 4 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.-PATENT SECTION

MAY 29 1990

NOTED

2026230608

United States Patent [19]

Brooks et al.

[11] Patent Number: 4,922,901

[45] Date of Patent: May 8, 1990

[54] DRUG DELIVERY ARTICLES UTILIZING ELECTRICAL ENERGY

[75] Inventors: Johnny L. Brooks; Donald L. Roberts, both of Winston-Salem; Jerry S. Simmons, Rural Hall, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 241,641

[22] Filed: Sep. 8, 1988

[51] Int. Cl.³ A61M 16/00; A61M 15/06; A24K 47/00

[52] U.S. Cl. 128/203.26; 128/202.27; 128/203.27; 128/204.13; 128/204.17; 128/203.12; 131/273; 131/329

[58] Field of Search 128/202.21, 203.12, 128/203.13, 203.15, 203.17, 203.26, 203.27, 204.13, 200.14, 200.23, 200.24, 204.17, 202.27

[56] References Cited

U.S. PATENT DOCUMENTS

1,771,366	7/1930	Wyss et al.	128/203.27
2,030,075	2/1936	Robinson	128/203.23
2,057,353	10/1936	Whittemore, Jr.	219/38
2,104,266	1/1938	McCormick	131/12
2,284,591	5/1942	Rose	128/200.14
2,332,799	10/1943	Hunn et al.	128/200.14
2,974,669	3/1961	Ellis	131/172
3,200,819	8/1965	Gilbert	128/208
3,889,690	6/1975	Guarnieri	131/185
3,918,464	11/1975	Kolodziej	131/173
4,036,224	7/1977	Choporis et al.	128/205.29
4,090,513	5/1978	Togawa	128/207.14
4,133,318	1/1979	Gross et al.	131/173
4,141,369	2/1979	Burruss	131/171 A
4,164,230	8/1979	Pearlman	131/171 R
4,193,411	3/1980	Faris et al.	131/171 R
4,214,146	7/1980	Schimanski	128/203.27
4,246,913	1/1981	Ogden et al.	131/171 A
4,303,083	12/1981	Burruss, Jr.	131/271
4,523,589	6/1985	Krauser	128/203.27
4,564,748	1/1986	Gupton	219/497
4,580,583	4/1986	Green, Jr.	131/330

4,601,287	7/1986	Royce et al.	128/204.17
4,735,217	4/1988	Gerth et al.	128/204.23
4,735,217	4/1988	Gerth et al.	131/273
4,771,796	9/1988	Myer	131/273

FOREIGN PATENT DOCUMENTS

0186280	7/1986	European Pat. Off.	128/200.14
2653133	5/1978	Fed. Rep. of Germany	
2704218	8/1978	Fed. Rep. of Germany	
3300992	7/1984	Fed. Rep. of Germany	128/200.14
2128256	10/1972	France	
48-8231	3/1973	Japan	
WO86/02528	5/1986	PCT Int'l Appl.	
197946	4/1924	United Kingdom	128/204.17

OTHER PUBLICATIONS

Novoloid Fibers, Kirk-Othmer: *Encyclopedia of Chemical Technology*, vol. 16, Third Edition, 1981, pp. 125-138.

Adsorption of Gases in Multimolecular Layers, *Journal of the American Chemical Society*, Braunauer et al., vol. 60, pp. 309-319, Feb. 1938.

Adsorption, Surface Area and Porosity, Gregg et al., pp. 35-49, 1967.

Novoloid Fibers, American Kynol, Inc., Catalogue.

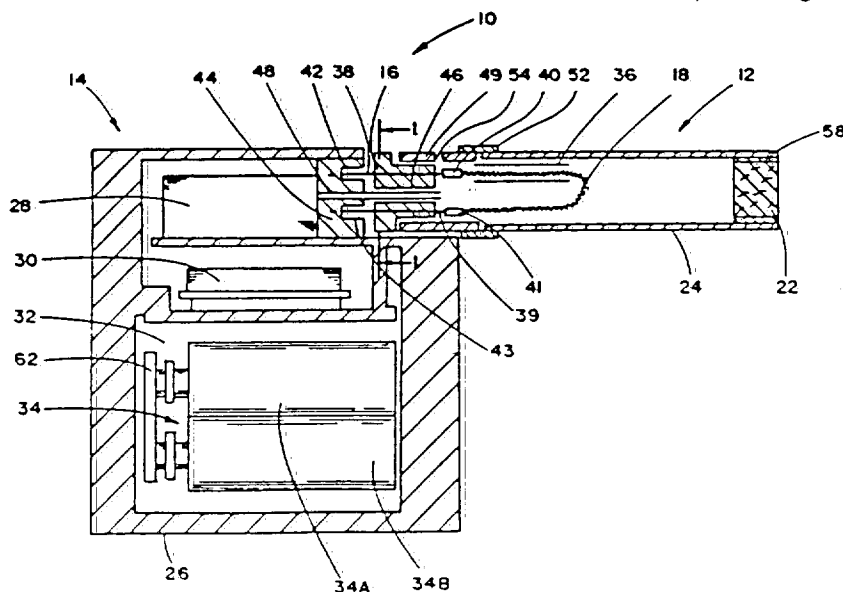
Primary Examiner—Edgar S. Burr

Assistant Examiner—Kimberly L. Asher

[57] ABSTRACT

Drug delivery articles employ an electrical resistance heating element and an electrical power source to provide a dose of a drug in aerosol form. The articles advantageously comprise a disposable portion and a reusable controller. The disposable portion, normally includes a drug and an air permeable resistance heating element having a surface area greater than 1 m²/g., which usually carries an aerosol forming material. The reusable controller normally includes a puff-actuated current actuation means, a time-based current regulating means to control the temperature of the heating element, and a battery power supply.

136 Claims, 7 Drawing Sheets



2026230609

United States Patent [19]

Litzinger

[11] Patent Number: 4,924,886

[45] Date of Patent: May 15, 1990

[54] SMOKING ARTICLE

[75] Inventor: Elmer F. Litzinger, Louisville, Ky.

[73] Assignee: Brown & Williamson Tobacco Corporation, Louisville, Ky.

[21] Appl. No.: 273,775

[22] Filed: Nov. 21, 1988

[51] Int. Cl.³ A24D 3/04

[52] U.S. Cl. 131/194; 131/361;
131/363; 131/364

[58] Field of Search 131/361, 363, 364, 359,
131/369, 198.1, 198.2, 194, 196

[56] References Cited

U.S. PATENT DOCUMENTS

3,774,622 11/1973 Steigerwald 131/198.2

4,474,191 10/1984 Steiner 131/198.2

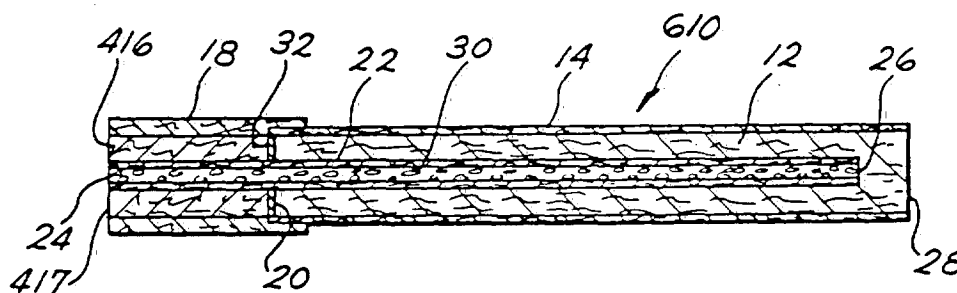
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A smoking device includes a tobacco column having a wrapper and either a mouthpiece or filter rod located coaxially at one end of the tobacco column. A rigid tube is concentrically located in the tobacco column. A substrate of porous material is located within the tube. A flavor releasing material and an aerosol generating material are also disposed within the tube. A smoke impermeable seal is located at the interface of the tobacco column and the mouthpiece/filter.

13 Claims, 2 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

MAY 21 1990

VOTED _____

2026230610

[54] SMOKING ARTICLE WITH EMBEDDED SUBSTRATE

[75] Inventor: Michael D. Shannon, Winston-Salem, N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 723,382

[22] Filed: Apr. 15, 1985

[51] Int. Cl.³ A24D 1/18; A24D 1/00; A24D 1/02

[52] U.S. Cl. 131/359; 131/273; 131/335; 131/196; 131/360

[58] Field of Search 131/360, 364, 194, 273, 131/356, 337, 335, 329, 362, 364

[56] References Cited

U.S. PATENT DOCUMENTS

Re. 27,214 11/1971 Nakahara .
 1,529,181 12/1924 Holmes .
 2,907,686 10/1959 Siegel .
 3,258,015 6/1966 Ellis .
 3,356,094 12/1967 Ellis .
 3,516,417 6/1970 Moses .
 3,738,374 7/1973 Bennett .
 3,943,941 4/1976 Boyd .
 4,044,777 8/1977 Boyd .
 4,079,742 4/1978 Ranier .
 4,284,089 8/1981 Ray .
 4,286,604 9/1981 Ehretsmann .
 4,326,544 4/1982 Hardwick .
 4,340,072 7/1982 Bolt .
 4,347,855 9/1982 Lanzillotti et al. .
 4,391,285 7/1983 Burnett et al. .
 4,407,308 10/1983 Baker .
 4,474,191 10/1984 Steiner .

FOREIGN PATENT DOCUMENTS

276250 1/1964 Australia .
 0117355 9/1984 European Pat. Off. .
 1294351 9/1975 Fed. Rep. of Germany .
 2057421 12/1984 France .
 2057422 12/1984 France .
 35-9894 5/1960 Japan .
 42-8684 12/1967 Japan .
 1431045 4/1972 United Kingdom .

OTHER PUBLICATIONS

Influence of Filter Additives on Smoke Composition, Rec. Adv. Tob. Sci., 4:47 (1978) M. L. Reynolds.

L. L. Lyerly, "Direct Vapor Chromatographic Determination of*** Triacetin in Cigarette Smoke," Tob Sci. 11:49 (1967).

J. E. Kiefer, et al., "Factors That Affect Elution of Plasticizer from Cigarette Filters", Eastman Kodak Publ. No. FTR-65.

Guinness World Book of Records, pp. 242-243 (1985 Edition).

Guinness World Book of Records, p. 194 (1966 Edition).

C. Hagg, General Inorganic Chemistry, at p. 592 (John Wiley & Sons, 1969).

Ames et al., Mut. Res. 31: 347-364 (1973).

Nago et al., Mut. Res. 42:335 (1977).

Hach's Chem. Dictionary, 34, 4th ed. (1969).

Lange's Handbook of Chemistry, 10: 272-74 (11th ed. 1973).

U.S. Pat. No. 4,347,855 (9/82) Lanzillotti et al.

U.S. Pat. No. 4,391,285 (7/83) Burnett et al.

U.S. Pat. No. 4,474,191 (10/84) Steiner.

U.S. Pat. No. 4,219,031 (8/80) Ranier.

U.S. Pat. No. 3,614,956 (10/71) Thornton.

Marshall Sittig, Tobacco Substitutes, Noyes Data Corp. (1976).

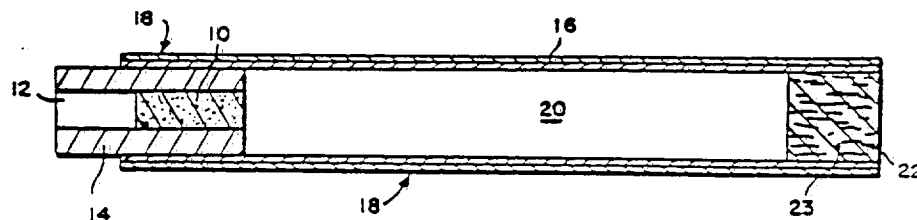
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Grover M. Myers; David G. Conlin

[57] ABSTRACT

The smoking article of the present invention has a short, combustible, preferably carbonaceous, fuel element, generally less than about 30 mm long, which is substantially free of volatile organic material. A physically separate aerosol generating means, preferably comprising a substrate bearing an aerosol forming substance, is located within a cavity in the fuel element, i.e., the aerosol generating means is at least partially embedded in the fuel element. This article may be provided with an external insulating member to reduce radial heat loss and/or with a heat conducting member to increase conductive heat transfer from the fuel element to the aerosol generating means.

28 Claims, 1 Drawing Sheet



RECEIVED
 PHILIP MORRIS MANAGEMENT CORP.
 LAW DEPT.-PATENT SECTION

JUN - 4 1990

[54] DEVICE FOR SELF-ADMINISTRATION OF
PHYSIOLOGICALLY ACTIVE
SUBSTANCES, WITH PREVENTION OF
OVERDOSING

[75] Inventors: Sven-Erik Nilsson, Döbeliusvägen
39, S-253 67 Helsingborg; Ove B.
Fernö, Helsingborg; Jan E. Lilja,
Kristianstad, all of Sweden

[73] Assignee: Sven-Erik Nilsson

[21] Appl. No.: 250,691

[22] PCT Filed: Mar. 20, 1987

[86] PCT No.: PCT/SE87/00146

§ 371 Date: Nov. 18, 1988

§ 102(e) Date: Nov. 18, 1988

[87] PCT Pub. No.: WO87/05813

PCT Pub. Date: Oct. 8, 1987

[30] Foreign Application Priority Data

Mar. 24, 1986 [SE] Sweden 8601351

[51] Int. Cl.⁵ A61M 11/00; A61M 16/00

[52] U.S. Cl. 128/200.23; 128/202.22;
128/203.13

[58] Field of Search 128/200.14, 200.23,
128/204.19, 204.21, 203.12, 203.13, 203.14,
203.23, 203.24, 200.11, 200.12, 200.13, 200.21,
200.22, 200.24, 202.21, 203.15, 204.11

[56] References Cited

U.S. PATENT DOCUMENTS

4,106,503 8/1978 Rosenthal et al. 128/203.12
4,393,884 7/1983 Jacobs 128/200.23
4,462,398 7/1984 Durkan et al. 128/200.14
4,817,822 4/1989 Rand et al. 128/200.23

FOREIGN PATENT DOCUMENTS

WO86/02275 4/1986 PCT Int'l Appl. 128/200.23

Primary Examiner—Edgar S. Burr

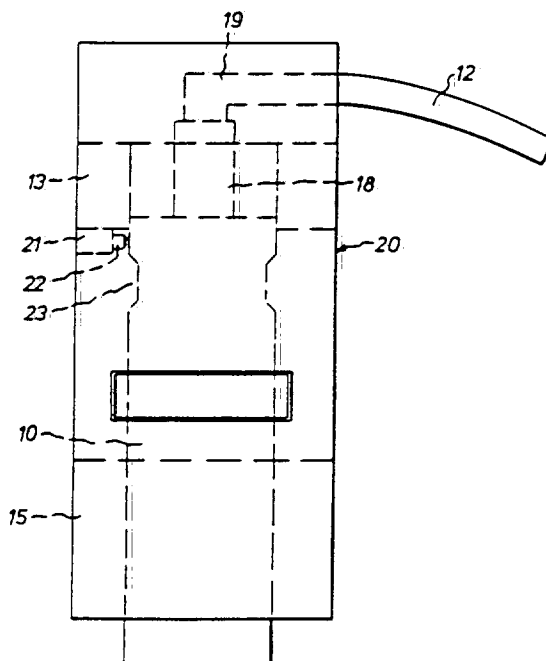
Assistant Examiner—Kimberly L. Asher

Attorney, Agent, or Firm—Burgess, Ryan and Wayne

[57] ABSTRACT

A device for self-administration of physiologically active substances without the occurrence of overdosing, includes a container accommodating at least one substance and propellant means for propelling the substances out of the container, nozzle means connected to the container for discharging a substance, a valve connected between the nozzle and the container such that a predetermined amount of the substance is propelled from the container each time the valve has been opened, and manually activated electronic control means for opening the valve in response to manual activation of the electronic control means and for preventing opening of the valve greater than a predetermined number of times within a predetermined time period.

4 Claims, 3 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT. - PATENT SECTION

AUG - 2 1990

NOTED none filed
~ (C. S. R. via search)

2026230612

Jameson et al.

[11] Patent Number: 4,937,431

[45] Date of Patent: Jun. 26, 1990

[54] APPARATUS FOR DISTRIBUTING A HEATED SCENT

[76] Inventors: **Richard N. Jameson, R.R. 2, Box 80;
Dana R. Cook, 1112 S. Elm, both of
Pittsburg, Kans. 66762**

[21] Appl. No.: 263,437

[22] Filed: Oct. 27, 1988

[51] Int. CL⁵ F22B 1/28

[52] U.S. Cl. 219/274; 219/272;

219/275; 239/59; 43/1

[58] Field of Search 219/271-276;
43/129, 1; 239/58, 59, 51.5

[56] **References Cited**

U.S. PATENT DOCUMENTS

611,560	9/1898	Chambers	43/129
2,959,354	11/1960	Beck	239/36
3,046,192	7/1962	Bilyeu	167/48
3,366,775	1/1968	Mycue	219/275

4,609,245	9/1986	Sakschek	239/36
4,722,477	2/1988	Floyd	239/36
4,735,010	4/1988	Grinarni	43/1
4,771,563	9/1988	Easley	43/129
4,773,178	9/1988	Marek	43/1

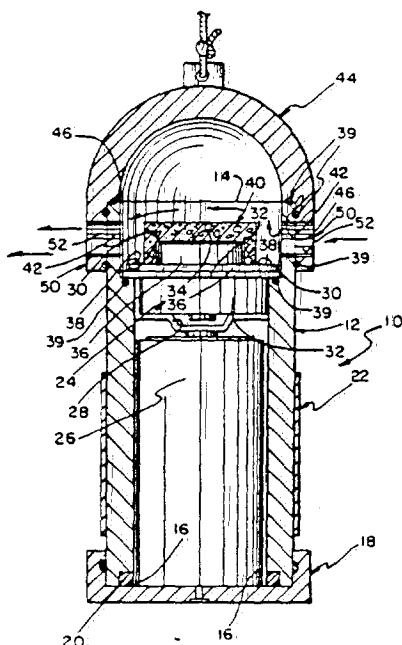
Primary Examiner—Teresa J. Walberg

Attorney, Agent, or Firm—John W. Carpenter

[57] **ABSTRACT**

An apparatus for producing heat to enhance an animal lure scent containing a hollow body, a base removably disposed to one end of the hollow body, and a body cap rotatably secured to another end of the hollow body. An electronic circuitry is disposed in the hollow body and includes a heat pot for supplying an odorless heat having a temperature of the body temperature of an animal to be lured. A scent pad is positioned against and over the heat pot to hold a scent of the animal to be lured and to insulate the heat pot during operation.

10 Claims, 3 Drawing Sheets



RECEIVED
PHILIP MORRIS-MANAGEMENT CORP.
LAW DEPT.-PATENT SECTION

AUG - 2: 1990

2028230613

Banerjee et al.

[11] Patent Number: 4,938,236

[45] Date of Patent: Jul. 3, 1990

[54] TOBACCO SMOKING ARTICLE

[75] Inventors: Chandra K. Banerjee, Pfafftown;
Henry T. Ridings, Lewisville, both of
N.C.

[73] Assignee: R. J. Reynolds Tobacco Company,
Winston-Salem, N.C.

[21] Appl. No.: 408,814

[22] Filed: Sep. 18, 1989

[51] Int. Cl.⁵ A24D 1/00; A24D 1/18

[52] U.S. Cl. 131/194; 131/271;
131/273; 131/360

[58] Field of Search 131/194, 270, 271, 273,
131/360, 359

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,104,266	1/1938	McCormick .
3,258,015	6/1966	Ellis et al. .
3,683,936	8/1972	O'Neil, Jr. .
4,079,742	3/1978	Rainer et al. .
4,149,548	4/1979	Bradshaw .
4,284,089	8/1981	Ray .
4,393,884	7/1983	Jacobs ..
4,708,151	11/1987	Shelar .

4,714,082	12/1987	Banerjee et al. .
4,756,318	7/1988	Clearman et al. .
4,774,971	10/1988	Vieten .
4,793,365	12/1988	Sensabaugh, Jr. et al. .

FOREIGN PATENT DOCUMENTS

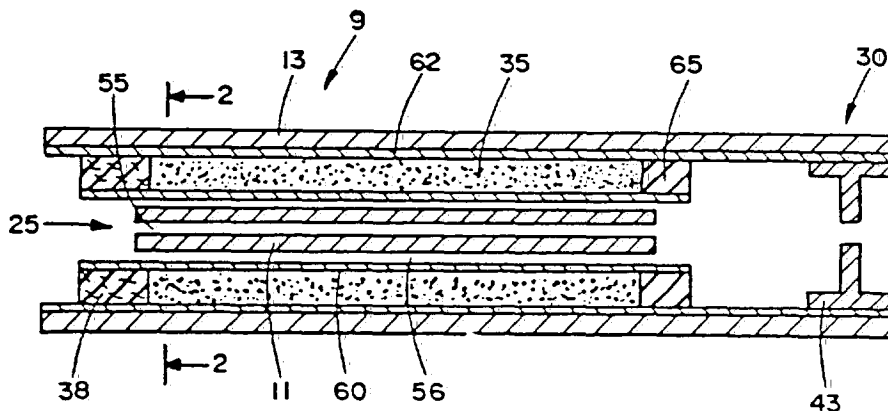
276250 6/1967 Australia .
86/02528 5/1986 World Int. Prop. O. .

Primary Examiner—V. Millin

[57] ABSTRACT

A cigarette provides tobacco flavor by heating tobacco, but not burning tobacco or any other material. A heat source which includes granular magnesium, granular iron, and finely divided cellulose generates heat upon contact thereof with an aqueous solution of potassium chloride. The heat source is in a heat exchange relationship with the tobacco. Heat generated by the heat source heats tobacco in a controlled manner. Flavors volatilize from the tobacco and are drawn from the cigarette and into the mouth of the smoker. Typical heat sources heat the tobacco to a temperature within about 70° C. to about 180° C. for 4 to 8 minutes.

47 Claims, 2 Drawing Sheets



2025230614

RECEIVED:
PHILIP MORRIS MANAGEMENT CORP
LAW DEPT-PATENT SECTION

JUL 10 1990

5. Deir
Sander
B. lose

United States Patent [19]

Ridings et al.

[11] Patent Number: 4,941,483

[45] Date of Patent: Jul. 17, 1990

[54] AEROSOL DELIVERY ARTICLE

[75] Inventors: Henry T. Ridings, Lewisville;
Chandra K. Banerjee, Pfafftown,
both of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company,
Winston-Salem, N.C.

[21] Appl. No.: 410,191

[22] Filed: Sep. 18, 1989

[51] Int. Cl.⁵ A24D 1/00; A24D 1/18

[52] U.S. Cl. 131/194; 131/271;
131/273; 131/360; 128/200.14

[58] Field of Search 131/194, 270, 271, 273,
131/360, 359; 128/200.14

[56] References Cited

U.S. PATENT DOCUMENTS

2,104,266 1/1938 McCormick .
3,258,015 6/1966 Ellis et al. .
3,683,936 8/1972 O'Neil, Jr. .
4,149,548 4/1979 Bradshaw .
4,284,089 8/1981 Ray .

4,393,884 7/1983 Jacobs .
4,774,971 10/1988 Vieten .

FOREIGN PATENT DOCUMENTS

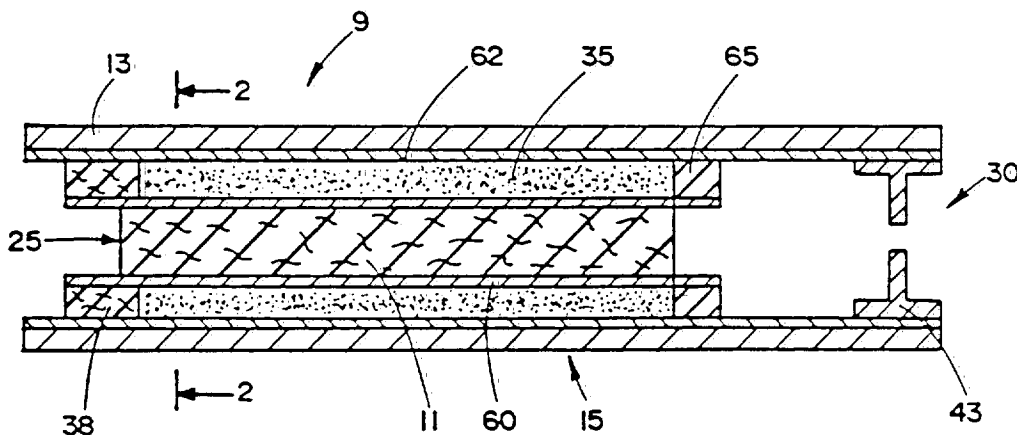
276250 6/1967 Australia .
86/02528 5/1986 PCT Int'l Appl. .

Primary Examiner—V. Millin

[57] ABSTRACT

An aerosol delivery article provides flavor or a dose of a drug by heating a flavor or a drug, but not burning any material. A heat source which includes granular magnesium, granular iron, and finely divided cellulose generates heat upon contact thereof with an aqueous solution of potassium chloride. The heat source is in a heat exchange relationship with the flavor or drug. Heat generated by the heat source heats the flavor or drug in a controlled manner. The flavor or drug volatilizes and is drawn into the mouth of the user of the article. Typical heat sources heat the flavor or drug to a temperature within about 70° C. to about 180° C. for 4 to 8 minutes.

23 Claims, 2 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.-PATENT SECTION

JUL 23 1990

Kelly
Sanders
Houghton
Charles

2026230615

4,942,883

DRUG DELIVERY DEVICE

Martin H. Newman, 77 Norwood St., Sharon, Mass. 02067

Filed Sep. 29, 1987; Ser. No. 102,540

Int. Cl.³ A61N 1/30

U.S. Cl. 128—798

5 Claims

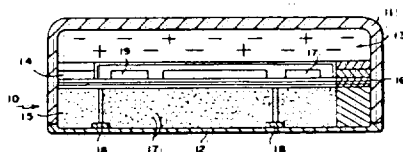
1. A self-contained transdermal medication delivery system for delivering a pre-specified medication to a body location comprising:

- a housing containing at least
 - a source of electrical current pulses;
 - microprocessor control means for automatically providing said current pulses in accordance with a fixed, pre-

determined program established in said microprocessor control means prior to manufacture of said system for controlling the level of said current pulses and the time period over which said pulses are to be provided;

means for retaining said pre-specified medication, being electrically charged, for placement at a body location for forming with said body location an electrical current path responsive to said current pulses to cause said medication to be delivered transdermally from said medication retaining means to said body location;

said microprocessor means thereby permitting a predetermined dosage of said pre-specified medication to be delivered automatically at a predetermined rate to said body location in accordance with said fixed, predetermined



program wherein said medication retaining means is formed separately from said housing and includes a hydrophilic membrane having molecules of a medication distributed therein, and further including

electrode means for coupling to said separately formed medication retaining means;

cable means for interconnecting said electrode means and said source of current pulses,

one or more separately formed cartridges containing medication in liquid form, each cartridge being inserted into said housing means for attachment to said cable means, said cable means including a channel for transporting said liquid medication to the membrane of said medication retaining means for distribution of said medication therein.

2026230616

4,942,037

TRANSDERMAL DELIVERY SYSTEMS

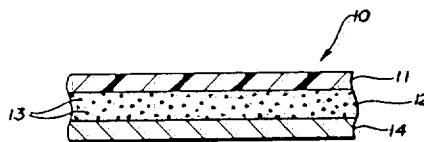
Joseph V. Bondi, Collegeville, and Alice E. Loper, Lederach,
both of Pa., assignors to Merck & Co., Inc., Rahway, N.J.

Filed Jun. 2, 1988, Ser. No. 202,088

Int. Cl.³ A61F 13/02

U.S. Cl. 424—448

2 Claims



1. A therapeutic system in the form of a transdermal patch for administering (+)-PHNO comprising (a) a backing member impermeable to (+)-PHNO, (b) a reservoir of solid silicone polymer matrix containing (+)-PHNO and glycerol wherein the said solid reservoir matrix constitutes a solvent for the drug wherein in said matrix the drug is present in excess of its solubility and there is additionally present glycerol as cosolvent in an amount of from about 0.5 to no greater than 40 percent by weight, (c) a rate controlling membrane of silicone polymer, and (d) optionally a face adhesive and wherein said patch provides said (+)-PHNO at a therapeutic rate of from about 2 micrograms to about 20 micrograms per square centimeter per hour.

2026230617

United States Patent [19]

Baker et al.

[11] Patent Number: 4,943,435

[45] Date of Patent: Jul. 24, 1990

[54] PROLONGED ACTIVITY NICOTINE PATCH

[75] Inventors: Richard W. Baker, Palo Alto; Frank Kochinke, Fremont; Carl Huang, Palo Alto, all of Calif.

[73] Assignee: Pharmetrix Corporation, Menlo Park, Calif.

[21] Appl. No.: 264,397

[22] Filed: Oct. 28, 1988

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 105,549, Oct. 5, 1987, Pat. No. 4,839,174.

[51] Int. Cl.³ A61L 15/00

[52] U.S. Cl. 424/448; 424/449; 424/486; 128/156; 128/632; 131/335

[58] Field of Search 424/448, 449, 486; 128/156, 632; 131/335

References Cited

U.S. PATENT DOCUMENTS

3,598,122	8/1971	Zaffaroni	128/268
3,598,123	8/1971	Zaffaroni	128/268
3,731,683	5/1973	Zaffaroni	128/268
3,742,951	7/1973	Zaffaroni	128/268
3,797,494	3/1974	Zaffaroni	128/268
3,996,934	12/1976	Zaffaroni	128/268
4,597,961	7/1986	Etscom	424/28

4,624,665	11/1986	Nuwayser	424/448
4,627,429	12/1986	Tsuk	128/156
4,638,043	1/1987	Szycher et al.	424/449
4,687,481	8/1987	Nuwayser	424/449
4,706,676	11/1987	Peck	128/632
4,715,387	12/1987	Rose	131/335

FOREIGN PATENT DOCUMENTS

3438284	7/1985	Fed. Rep. of Germany
61-251619	8/1986	Japan

OTHER PUBLICATIONS

J. E. Rose et al., "Transdermal Administration of Nicotine," *Drug and Alcohol Dep.*, 13, 209-213, 1984.

J. F. Komerska, "Urethane Films—Transdermal Opportunities," *J. Plastic Film and Sheeting*, 3:58-64, 1987.

Primary Examiner—Henry F. Epstein

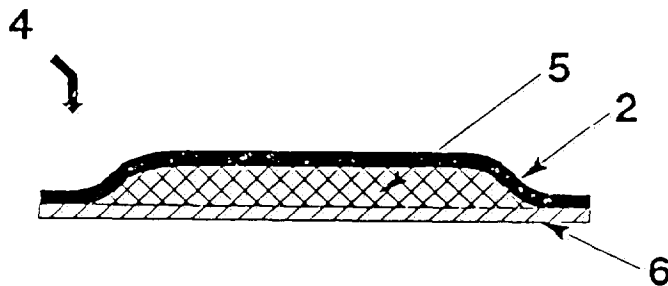
Assistant Examiner—P. S. Ryan

Attorney, Agent, or Firm—A. J. Castro; J. Farrant

[57] ABSTRACT

A transdermal patch for delivering nicotine for prolonged periods of 12-24 hours. The patch includes a rate-controlling membrane or monolith to keep the nicotine flux within useful and safe limits. The patch is typically replaced once a day, and can be used for smoking cessation therapy or in other situations where systemic nicotine delivery is indicated.

22 Claims, 8 Drawing Sheets



PHILIP M. ROSE, JR.
PHILIP M. ROSE, JR. & ASSOCIATES
LAW FIRM-PATENT SECTION

AUG 20 1990

NOTED _____

[54] SMOKING OF REGENERATED TOBACCO SMOKE

[76] Inventor: Jed E. Rose, 1371 Appleton Way, Venice, Calif. 90291

[21] Appl. No.: 322,689

[22] Filed: Mar. 13, 1989

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 840,072, Mar. 17, 1986, Pat. No. 4,846,199.

[51] Int. Cl.³ A24F 47/00

[52] U.S. Cl. 131/270; 131/273

[58] Field of Search 131/173, 270, 194, 359, 131/369

[56] References Cited

U.S. PATENT DOCUMENTS

1,826,331 10/1931 Traube 131/173

3,508,558 4/1970 Seyburn 131/173

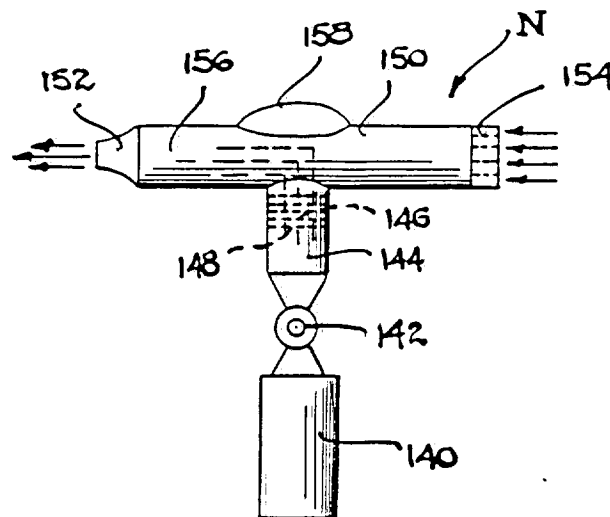
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Robert J. Schaap

[57] ABSTRACT

A method and apparatus for regenerating tobacco smoke such that certain of the constituents may be smoked upon aerosolization thereof. The method and apparatus relies upon generating smoke from tobacco leaves or other grown plant substances and passing the smoke through a solvent, such as water. Certain of the fluidized components and certain of the gaseous components in the stream of tobacco smoke may then be captured in and preferably dissolved in the solvent. The dissolved or suspended smoke components may then be formed into an aerosol for inhalation by a user. By dissolving selected components in the solvent, many of the harmful gaseous and fluidized constituents of a smoke stream are eliminated. Moreover, an aerosol is generated such that the particle sizes of the aerosol are sufficiently large that they are predominantly deposited in the upper respiratory tract. In this way, the smoker receives the sensations to which the smoker is normally accustomed from tobacco smoke without many of the harmful side effects of tobacco smoke.

39 Claims, 2 Drawing Sheets

RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT. PATENT SECTION

AUG 9 1990

NOTED _____

2026230619

United States Patent [19]

Egilmex

[11] Patent Number: 4,945,929

[45] Date of Patent: Aug. 7, 1990

[54] AEROSOL DEVICE SIMULATING A SMOKING ARTICLE

[75] Inventor: Nazli Egilmex, Southampton, England

[73] Assignee: British-American Tobacco Co., Ltd., London, England

[21] Appl. No.: 62,815

[22] Filed: Jun. 16, 1987

[30] Foreign Application Priority Data

Jun. 18, 1986 [GB] United Kingdom 8614805

[51] Int. Cl.⁵ A24F 47/00; A61M 11/00; A61M 15/06

[52] U.S. Cl. 131/273; 128/200.21; 128/202.21

[58] Field of Search 131/273; 128/200.21; 128/202.21

[56] References Cited

U.S. PATENT DOCUMENTS

2,830,597 4/1958 Kummli 131/273
4,171,000 10/1979 Uhle 131/273

4,393,884 7/1983 Jacobs 131/273

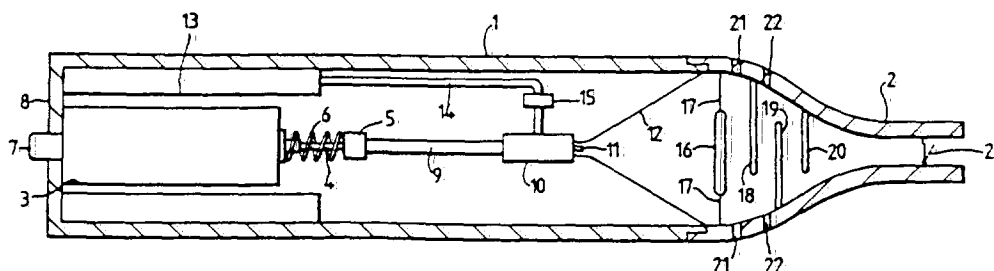
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A nicotine dispensing aerosol device has nicotine and propellant storage containers connected to atomization nozzle from which a nicotine-aerosol spray can flow. A conical aerosol confining chamber extends from the nozzle, the cross-section of the chamber enlarging away from the nozzle. Large aerosol particles are removed by impaction on the upstream face of an impaction member, which member is located in the wider, outlet region of the aerosol confining chamber. A series of baffles are provided downstream of the impaction member, which baffles serve to produce a long, sinuous path for aerosol flow. The duration of the passage of the aerosol from the nozzle to the user is thereby increased, allowing more evaporation of the particulate phase of the aerosol. The device is, therefore, operable to dispense nicotine in an aerosol of a constitution which approximates that of tobacco smoke.

15 Claims, 1 Drawing Sheet



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT-PATENT SECTION

AUG 9 1990

NOTED (British publication
circulated last year)

2026230620

United States Patent [19]
Gori

[11] Patent Number: 4,945,931
[45] Date of Patent: Aug. 7, 1990

[54] SIMULATED SMOKING DEVICE

[75] Inventor: Gio B. Gori, Bethesda, Md.
[73] Assignee: Brown & Williamson Tobacco Corporation, Louisville, Ky.

[21] Appl. No.: 379,831

[22] Filed: Jul. 14, 1989

[51] Int. Cl.³ A24B 15/00

[52] U.S. CL. 131/335; 131/194;
131/271; 131/273

[58] Field of Search 131/331, 271, 273, 194,
131/335, 333

[56] References Cited

U.S. PATENT DOCUMENTS

3,200,819 8/1965 Gilbert 131/273 X
4,171,000 10/1979 Uhle 131/273
4,393,884 7/1983 Jacobs 131/273

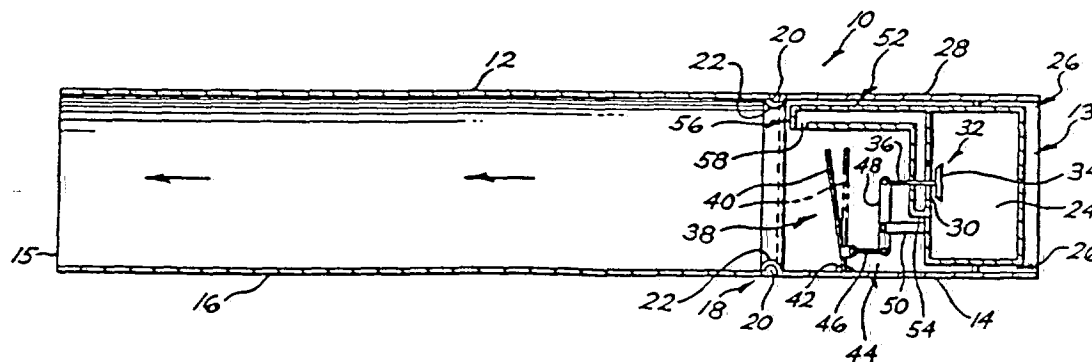
Primary Examiner—V. Millin
Assistant Examiner—J. L. Doyle

Attorney, Agent, or Firm—Charles G. Lamb

[57] ABSTRACT

A simulated smoking device includes a hollow tube with a capsule of pressurized aerosol generating material located inside the tube. An air flow passage is defined between the capsule and tube wall. The capsule includes an aerosol outlet port having a valve for selectively opening and closing the outlet port. An air operated valve activator is located inside the tube downstream of the air flow passage and is operatively connected to the valve. An aerosol passage communicates with the aerosol outlet port of the capsule and has a discharge end downstream of the air passage. Air is drawn into the tube, passes through the air passages, and impacts the air operated valve activator causing the valve to move opening the aerosol outlet port of the capsule releasing aerosol into the air flow downstream of the air operated valve activator.

10 Claims, 2 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT SECTION

AUG 9 1990

NOTED: _____

2026230621

[54] SMOKING ARTICLES UTILIZING ELECTRICAL ENERGY

[75] Inventors: Johnny L. Brooks; Donald L. Roberts, both of Winston-Salem; Jerry S. Simmons, Rural Hall, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 242,086

[22] Filed: Sep. 8, 1988

[51] Int. Cl.⁵ A24D 1/00; A24F 1/00; A24F 47/00; A61M 16/00

[52] U.S. Cl. 131/329; 131/273; 131/194; 128/202.21; 128/203.26; 128/203.27; 128/204.21

[58] Field of Search 131/329, 194, 273; 128/202.21, 202.27, 203.12, 203.13, 203.15, 204.21, 203.17, 203.26, 203.27, 204.13, 204.23

[56] References Cited

U.S. PATENT DOCUMENTS

- 1,771,366 7/1930 Wyss et al. .
 1,968,509 7/1934 Tiffany .
 2,057,353 10/1936 Whittemore, Jr. .
 2,104,266 1/1938 McCormick .
 2,974,669 3/1961 Ellis .
 3,200,819 8/1965 Gilbert .
 3,889,690 6/1975 Guarnieri .
 3,918,464 11/1975 Kolodziej .
 3,943,941 3/1976 Boyd et al. 131/359
 4,133,318 1/1979 Gross et al. .
 4,141,369 2/1979 Burruss .
 4,164,230 8/1979 Peariman .
 4,193,411 3/1980 Faris et al. .
 4,246,913 1/1981 Ogden et al. .
 4,303,083 12/1981 Burruss, Jr. .
 4,523,589 6/1985 Krauser .
 4,564,748 1/1986 Gupton .
 4,580,583 4/1986 Green, Jr. .

- 4,708,151 11/1987 Shelar .
 4,714,082 12/1987 Banerjee et al. .
 4,735,217 4/1988 Gerth et al. .
 4,756,318 7/1988 Clearman et al. .
 4,771,796 9/1988 Myer .

FOREIGN PATENT DOCUMENTS

- 174645 3/1986 European Pat. Off. .
 186280 7/1986 European Pat. Off. .
 212234 3/1987 European Pat. Off. .
 2653133 5/1978 Fed. Rep. of Germany .
 2704218 8/1978 Fed. Rep. of Germany .
 3300992 7/1984 Fed. Rep. of Germany .
 2128256 10/1972 France .
 48-8231 3/1973 Japan .
 WO86/02528 5/1986 PCT Int'l Appl. .
 197946 4/1924 United Kingdom .

OTHER PUBLICATIONS

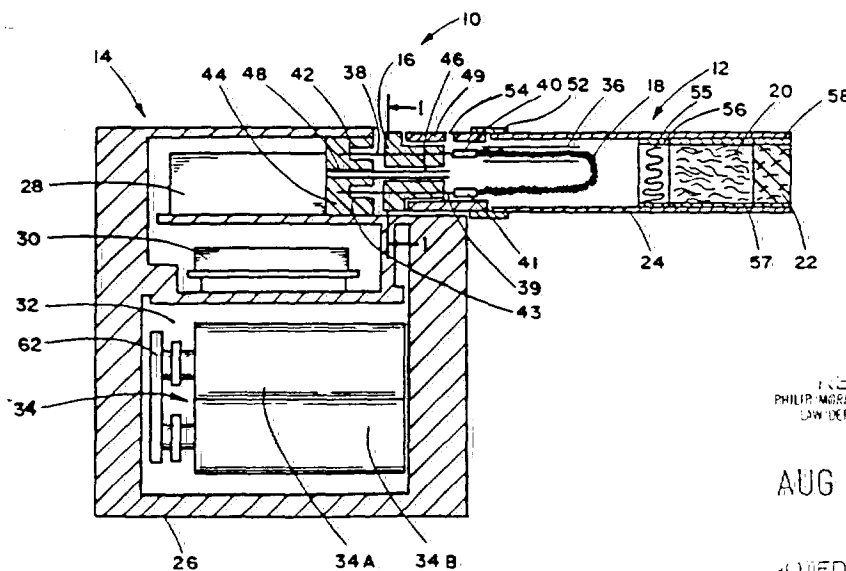
Tobacco and Tobacco Smoke, Wynder et al., pp. 482 and 522 (1967).

Primary Examiner—V. Millin

[57] ABSTRACT

Smoking articles employ an electrical resistance heating element and an electrical power source to provide a tobacco-flavored smoke or aerosol and other sensations of smoking. The smoking articles advantageously comprise a disposable portion and a reusable controller. The disposable portion, which may be a cigarette, normally includes (i) an air permeable resistance heating element having a surface area greater than 1 m²/g, which usually carries an aerosol forming material, and (ii) a charge or roll of tobacco. The reusable controller normally includes a puff-actuated current actuation means, a time-based current regulating means to control the temperature of the heating element, and a battery power supply.

202 Claims, 8 Drawing Sheets



RECEIVED
 PHILIP MORRIS MANAGEMENT CORP.
 LAW DEPT.-PATENT SECTION

AUG 16 1990

JOINED:

United States Patent [19]

Brooks et al.

[11] Patent Number: 4,947,875

[45] Date of Patent: Aug. 14, 1990

[54] FLAVOR DELIVERY ARTICLES UTILIZING ELECTRICAL ENERGY

[75] Inventors: Johnny L. Brooks; Donald L. Roberts, both of Winston-Salem; Jerry S. Simmons, Rural Hall, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 242,083

[22] Filed: Sep. 8, 1988

[51] Int. Cl.³ A24F 1/00; A24F 47/00

[52] U.S. Cl. 131/330; 131/273; 131/194; 131/195; 128/202.21; 128/203.27; 128/204.23; 128/204.24

[58] Field of Search 131/330; 273, 194, 195; 128/202.21; 203.27, 204.23, 204.29

[56] References Cited

U.S. PATENT DOCUMENTS

1,771,366 7/1930 Wyss et al. .
1,968,509 7/1934 Tiffany .
2,057,353 10/1936 Whittemore, Jr. .
2,104,266 1/1938 McCormick .
2,974,669 3/1961 Ellis .
3,200,819 8/1965 Gilbert .
3,889,690 6/1975 Guarnieri .
3,918,464 11/1975 Kolodziej .
4,133,318 1/1979 Gross et al. .
4,141,369 2/1979 Burruss .
4,164,230 8/1979 Pearlman .
4,193,411 3/1980 Faris et al. .
4,246,913 1/1981 Ogden et al. .

4,303,083 12/1981 Burruss, Jr. .
4,523,589 6/1985 Krauser .
4,564,748 1/1986 Gupton .
4,580,583 4/1986 Green, Jr. .
4,735,217 4/1988 Gerth et al. .
4,771,796 9/1988 Myer .

FOREIGN PATENT DOCUMENTS

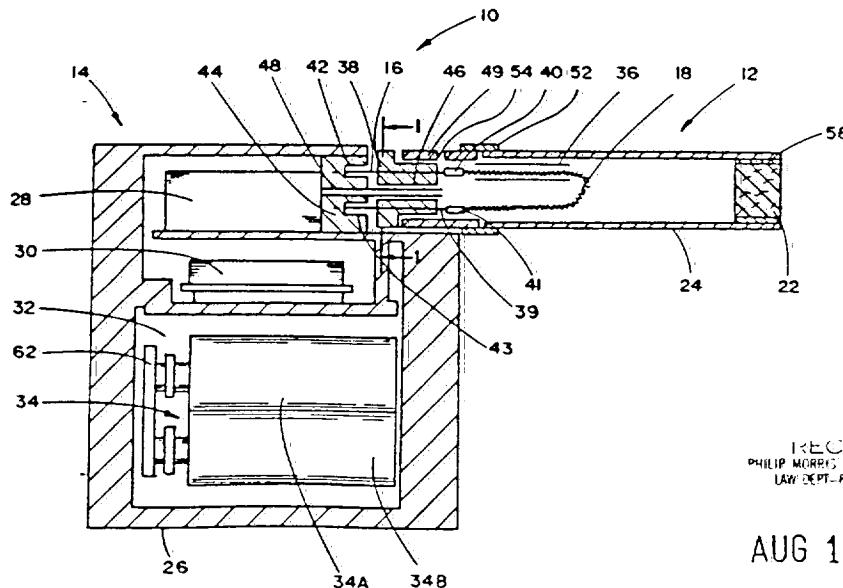
186280 7/1986 European Pat. Off. .
2653133 5/1978 Fed. Rep. of Germany .
2704218 8/1978 Fed. Rep. of Germany .
3300992 7/1984 Fed. Rep. of Germany .
2128256 10/1972 France .
48-8231 3/1973 Japan .
WO86/02528 5/1986 PCT Int'l Appl. .
197946 4/1924 United Kingdom .

Primary Examiner—V. Millin

[57] ABSTRACT

Flavor delivery articles employ an electrical resistance heating element and an electrical power source to provide a flavored aerosol. The articles advantageously comprise a disposable portion and a reusable controller. The disposable portion normally includes a flavor substance and an air permeable resistance heating element having a surface area greater than $1 \text{ m}^2/\text{g}$, which usually carries an aerosol forming substance. The reusable controller normally includes a puff-actuated current actuation means, a time-based current regulating means to control the temperature of the heating element, and a battery power supply.

136 Claims, 8 Drawing Sheets



RECEIVED
PHILIP MORRIS MANAGEMENT CORP
LAW DEPT.-PATENT SECTION

AUG 16 1990

OTED _____

2026230623

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : B05B 5/025, 5/053	A1	(11) International Publication Number: WO 90/03224
		(43) International Publication Date: 5 April 1990 (05.04.90)

(21) International Application Number: PCT/US89/04102

(22) International Filing Date: 20 September 1989 (20.09.89)

(30) Priority data:
248,558 23 September 1988 (23.09.88) US

(71) Applicant: BATTELLE MEMORIAL INSTITUTE [US/US]; 505 King Avenue, Columbus, OH 43201-2693 (US).

(72) Inventors: GREENSPAN, Bernard, J. ; 2337 Enterprise Drive, Richland, WA 99352 (US). MOSS, Owen, R. ; 1129 South Benton, Kennewick, WA 99336 (US).

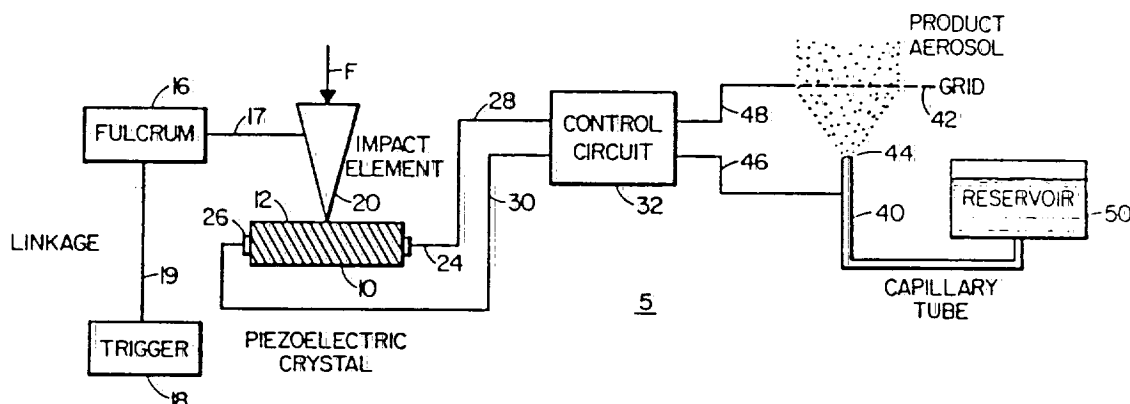
(74) Agents: SHAWEKER, Kenneth, E. et al.; Battelle Memorial Institute, 505 King Avenue, Columbus, OH 43201-2693 (US).

(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), DK, FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), NO, SE (European patent).

Published*With international search report.**Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.*RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.-PATENT SECTION

MAY 22 1990

(54) Title: NEBULIZER DEVICE



(57) Abstract

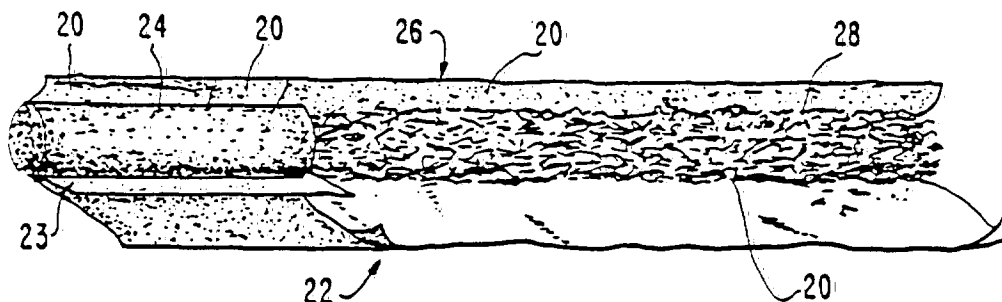
The present invention relates to a portable nebulizer capable of producing a finely divided aerosol having uniformly sized droplets. The nebulizer includes a source of fluid (50) such as a capillary tube (40) coupled to a fluid reservoir (50) to which a high voltage is applied in order to generate the aerosol by electrical atomization. The nebulizer further includes a piezoelectric crystal (10) and a mechanism (16, 17, 18, 19, 20) for deforming the crystal (10) so as to generate the required voltage. By using electrical atomization to generate the aerosol and by piezoelectrically generating the voltage required for atomization, a nebulizer is provided which may be of small size so as to be suitable for hand held operations yet is capable of producing measured amounts of finely divided aerosols which are substantially monodispersed.



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁺ : A24B 15/30, A24C 5/7 A24D 1/02		A1	(11) International Publication Number: WO 89/ 06911 (43) International Publication Date: 10 August 1989 (10.08.89)
(21) International Application Number: PCT/US88/00204 (22) International Filing Date: 28 January 1988 (28.01.88) (71) Applicant: C.A. BLOCKERS, INC. [US/US]; 2340 Meidinger Tower, Louisville Galleria, Louisville, KY 40202 (US). (72) Inventors: WADDELL, William, J. ; 6604 Gunpowder Lane, Prospect, KY 40059 (US). MARLOWE, Carolyn ; 6604 Gunpowder Lane, Propect, KY 40059 (US). KEENEY, L., Douglas ; 54 Tepee Road, Louisville, KY 40207 (US). (74) Agents: BOLAND, Thomas, R. et al.; Vorys, Sater, Seymour & Pease, Suite 1111, 1828 L Street, N.W., Washington, DC 20036-5104 (US).		(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE, DE (European patent), DK, FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent). Published With international search report. RECEIVED PHILIP MORRIS MANAGEMENT CORP. LAW DEPT.-PATENT SECTION SEP 25 1989 JES. Clipping NOTED J. Chasen F. Friedman Ted Sander	

(54) Title: PROCESS FOR MANUFACTURING CIGARETTES EMPLOYING PRESELECTED ALCOHOLS



(57) Abstract

A process for manufacturing cigarettes (22) which reduces health risks to smokers. According to this process redried cut rag tobacco (28) is sprayed with one or more preselected alcohols which are capable, when the vapors thereof are inhaled by the smoker, of inhibiting or blocking the selective localization of at least one nitrosamine and/or a metabolite thereof in the smoker's tissues such as those of the epithelial lining of his lungs. An example of such an alcohol is cyclohexanol in an ethyl alcohol solution. After the solution has been sprayed on the tobacco, the tobacco is machined in a conventional manner into the final cigarette (22), either filtered (24) or unfiltered. Upon smoking, the blocking alcohol is then heat released into the smoke stream, resulting in the desired blocking effect in the smoker, without noticeably altering the



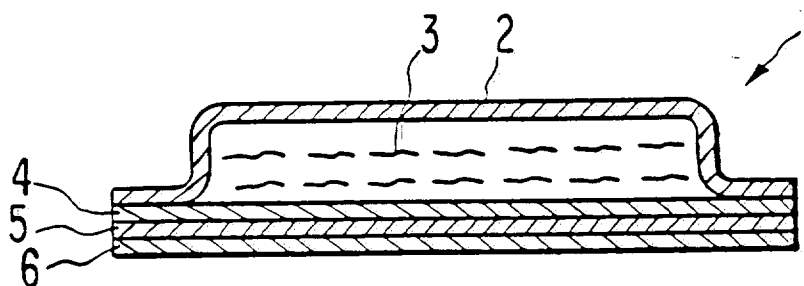
PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁴ : A61L 15/03, A61K 9/70		A1	(11) International Publication Number: WO 89/12470 (43) International Publication Date: 28 December 1989 (28.12.89)
(21) International Application Number: PCT/US89/02561 (22) International Filing Date: 13 June 1989 (13.06.89) (30) Priority data: 206,546 14 June 1988 (14.06.88) US 284,283 14 December 1988 (14.12.88) US (60) Parent Applications or Grants (63) Related by Continuation US 206,546 (CIP) Filed on 14 June 1988 (14.06.88) US 284,283 (CIP) Filed on 14 December 1988 (14.12.88) (71) Applicant (for all designated States except US): ALZA CORPORATION [US/US]; 950 Page Mill Road, Palo Alto, CA 94303-0802 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): OSBORNE, James, L. [US/US]; 2365 Thompson Court, Mountain View, CA 94043 (US). NELSON, Melinda [US/US]; 1127 Hollenbeck Road, Sunnyvale, CA 94087 (US). ENSCORE, David, James [US/US]; 18291 Montpere Way, Saratoga, CA 95070 (US). YUM, Su, II [US/US]; 1021 Runnymede Court,		Los Altos, CA 94022 (US). GALE, Robert, M. [US/US]; 1276 Russell Avenue, Los Altos, CA 94022 (US). CAMPBELL, Patricia, S. [US/US]; 140 Middlefield Road, Palo Alto, CA 94301 (US). (74) Agents: STONE, Steven, F. et al.; ALZA Corporation, 950 Page Mill Road, Palo Alto, CA 94303-0802 (US). (81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), NO, SE, SE (European patent), US, US. Published With international search report. With amended claims and statement. RECEIVED PHILIP MORRIS MANAGEMENT CORP. LAW DEPT.-PATENT SECTION JAN 29 1990 NOTED _____	

(54) Title: SUBSATURATED TRANSDERMAL DELIVERY DEVICE



(57) Abstract

Subsaturated, rate controlled delivery devices (1) for delivering an agent (5). The initial equilibrated concentration of the agent in the agent reservoir (3) and the adhesive (5) is below saturation. The initial loading of the agent in reservoir (3) is sufficient to prevent the activity of the agent in the reservoir (3) from decreasing by more than about 75 % and preferably no more than about 25 % during the predetermined period of administration. The thicknesses of the adhesive (5), rate controlling membrane (4) and reservoir (3) layers are selected so that at least 50 % and, preferably at least 75 % of the initial equilibrated agent loading is in the reservoir layer (3). The devices (1) are usable to deliver agents which are liquid at body temperatures such as benzotropine, secoverine, nicotine, arecoline, polyethylene glycol monolaurate, glycerol monolaurate, glycerol monooleate and ethanol, for example.

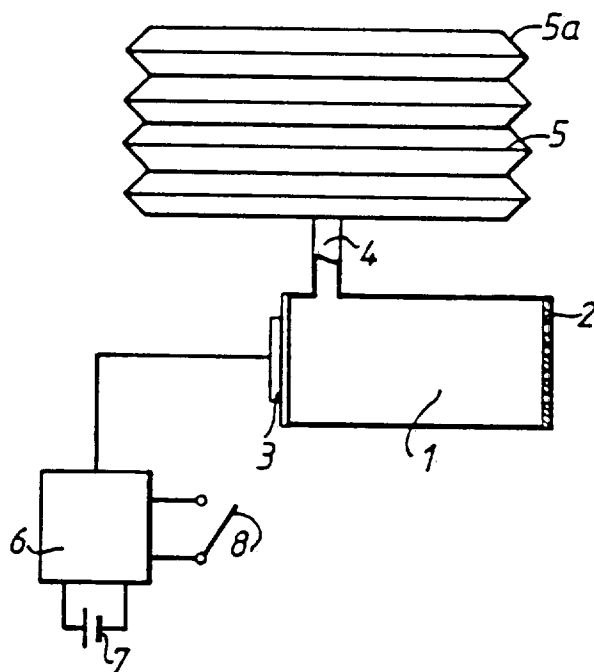
2026230626

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : B05B 17/06	A1	(11) International Publication Number: WO 90/01997 (43) International Publication Date: 8 March 1990 (08.03.90)
(21) International Application Number: PCT/GB89/00944 (22) International Filing Date: 15 August 1989 (15.08.89) (30) Priority data: 8819473.3 16 August 1988 (16.08.88) GB (71) Applicant (for all designated States except US): P.A. CONSULTING SERVICES LIMITED [GB/GB]; Cambridge Laboratory, Melbourn, Royston, Hertfordshire SG8 6DP (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): JENSEN, Borge, Riis [DK/BE]; Dieweg 54/7, B-1180 Brussels (BE). (74) Agent: DAWSON, Elizabeth, A.; A.A. Thornton & Co., Northumberland House, 303-306 High Holborn, London WC1V 7LE (GB).		(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report.</i> <div style="text-align: center;"> RECEIVED PHILIP MORRIS MANAGEMENT CORP. LAW DEPT-PATENT SECTION APR 23 1990 NOTED _____ </div>

(54) Title: ELECTRONIC AEROSOL GENERATOR**(57) Abstract**

An aerosol generator comprises a reservoir (5) for liquid to be dispensed and an exit cavity (1) having a plurality of exit orifices formed in an orifice plate (2). The cavity (1) is coupled to a piezoelectric transducer assembly (4) arranged to induce pressure variations in the exit cavity. A control circuit (6) is connected to the piezoelectric transducer assembly (4) and the exit cavity (1) to control the flow of liquid from the reservoir (5) through the exit orifices (3).

2026230627

(21) Int. Application Number: PCT/FR89/00501

(22) Int. Filing Date: 28 September 1989 (28.09.89)

(30) Priority data:
88/12933 29 September 1988 FR
(29.09.88)

(71)(72) Applicant and Inventor: JOST, Didier,
Georges [FR/FR]; 32, rue du Coëtlosquet, F-
57000 Metz (FR).

(72) Inventor; and
(75) Inventor/Applicant (for US only): JOST, Bernard
[FR/FR]; 13, rue Rabelais, F-57000 Metz
(FR).

(81) Designated States: AT (European patent), AU,
BE (European patent), BR, CH (European pa-
tent), DE (European patent), DK, FI, FR (Eu-
ropean patent), GB (European patent), IT
(European patent), JP, LU (European patent),
NL (European patent), NO, SE (European pa-
tent), SU, US.

Published
With international search report.

(51) International Patent Classification⁵:

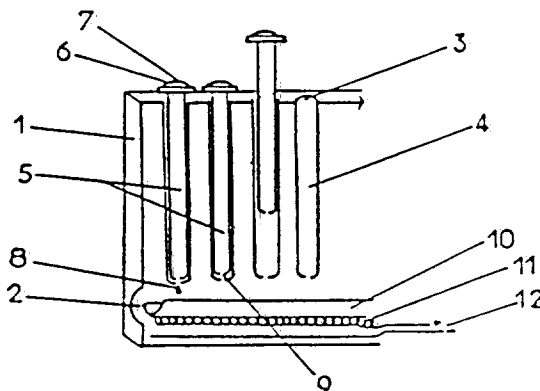
A61L 9/03

A1

(11) Int. Publication Number: WO 90/03192

(43) Int. Publication Date: 5 April 1990 (05.04.90)

(54) Title: DEVICE FOR ALLOWING THE EMANATION OF AROMAS OR ESSENTIAL OILS



(57) Abstract

The invention relates to a device allowing the simultaneous emanation of different aromas or essential oils with a view to instantaneously benefiting from the deodorizing, perfuming and therapeutic qualities of said aromas or essential oils. The device is comprised of a support (1) which receives a plurality of small removable reservoirs (5) wherein are conditioned a variety of aromas. By pressing with the finger on the upper extremity (7) of the reservoir, the latter liberates as desired one or a plurality of essence droplets (8) in a horizontal gutter (10) made of thin metal and provided at the base of the casing, which gutter is heated to the temperature required for the evaporation of said essence (8) by means of a resistance (11) which is integral with the gutter (10), the resistance being supplied by an energy source (12) which is external or integral with the casing. The casing is formed by two lateral hollow parts (2) in order to free emanations of aromas. The device according to the invention is intended for diffusion of essential oils in all closed or closable living spaces.

2026230628

A61K

(21) Int. Application Number: PCT/JP89/01323	(51) International Patent Classification ⁵ : A61K 9/20	(11) Int. Publication Number: WO 90/07327
(22) Int. Filing Date: 28 December 1989 (28.12.89)	A1	(43) Int. Publication Date: 12 July 1990 (12.07.90)
<p>(30) Priority data: 63/331821 28 December 1988 JP (28.12.88)</p>		
<p>(71) Applicant (for all designated States except US): TAISHO PHARMACEUTICAL CO., LTD. [JP/JP]; 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).</p>		
<p>(72) Inventors; and:</p>		
<p>(75) Inventors/Applicants (for US only): YUASA, Hiroshi [JP/JP]; Higashigaoka Apartment Room 305, 12-1, Hatagaya 2-chome, Shibuya-ku, Tokyo 151 (JP). KANAYA, Yoshio [JP/JP]; 15-3, Nogata 5-chome, Nakano-ku, Tokyo 165 (JP). OMATA, Kazuki [JP/JP]; 22-6, Honchou 6-chome, Meguro-ku, Tokyo 152 (JP).</p>		
<p>(74) Agent: KITAGAWA, Tomizou; Taisho Pharmaceutical Co., Ltd., 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).</p>		
<p>(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US.</p>		
<p>Published With international search report.</p>		
<p>(54) Title: STRESS SCATTERING METHOD IN TABLETING</p>		
<p>(57) Abstract:</p>		
<p>This invention relates to a tableting composition containing minute gelatine balls and/or foams as stress scattering agents so as to minimize the disintegration of microcapsules on the transformation of medicine during tableting; and a stress scattering method in tableting. The use of the tableting composition according to the present invention enables tablets to be made without causing microencapsulated medicine powder, enzymes, germs or substances of a low melting point to be transformed or disintegrated.</p>		

(21) Int. Application Number: PCT/US89/05798	(51) International Patent Classification ⁵ : A61K 9/70, A61L 15/00	(11) Int. Publication Number: WO 90/07328
(22) Int. Filing Date: 22 December 1989 (22.12.89)	A1	(43) Int. Publication Date: 12 July 1990 (12.07.90)
<p>(30) Priority data: P 38 44 247.7 29 December 1988 DE (29.12.88)</p>		
<p>(71) Applicant (for all designated States except US): RIKER LABORATORIES, INC. [US/US]; P.O. Box 33427, Saint Paul, MN 55133 (US).</p>		
<p>(72) Inventors; and:</p>		
<p>(75) Inventors/Applicants (for US only): KRECKEL, Karl, W. [DE/DE]; Wilbecke 12-14, P.O. Box 1340, D-4280 Borken I (DE). ZERBE, Horst-Georg [DE/DE]; Wilhelm-Busch-Strasse 4, D-4281 Velen (DE).</p>		
<p>(74) Agents: SPRAGUE, Robert, W. et al.; Minnesota Mining and Manufacturing Company, P.O. Box 33427, St. Paul, MN 55133-3427 (US).</p>		
<p>(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.</p>		
<p>Published With international search report.</p>		
<p>(54) Title: APPLICATION SYSTEM FOR DRUG CONTAINING MICROEMULSIONS</p>		
<p>(57) Abstract</p>		
<p>The invention deals with devices, in particular with bandage strips, for a transdermal delivery of drugs to patients, whereby the drug formulations include highly viscous preparations, topical solutions of a low viscosity and micro-emulsions of a low viscosity containing the drugs. Depending on the consistency of the medium containing the drug, the drug formulation is stored in a reservoir, consisting, e.g., of a punched out cavity or of an absorbent piece of material, which is encased or supported by a carrier element (a formed material piece or a non-woven fleece tape) adhering to the skin by means of a skin-compatible adhesive, whereby specially formed protective films are applied at the filling and delivery side during the storage of the device to prevent a lateral migration, and whereby during its use, the device can be refilled with dosed amounts by the patient without requiring a removal of the device from the skin surface to be treated (Fig. 2).</p>		

A61K

(21) Int. Application Number: PCT/JP89/01323	(51) International Patent Classification ⁵ : A61K 9/20	(11) Int. Publication Number: WO 90/07327
(22) Int. Filing Date: 28 December 1989 (28.12.89)	A1	(43) Int. Publication Date: 12 July 1990 (12.07.90)
(30) Priority data: 63/331821 28 December 1988 JP (28.12.88)	(54) Title: STRESS SCATTERING METHOD IN TABLETING	
(57) Abstract:		
This invention relates to a tableting composition containing minute gelatine balls and/or foams as stress scattering agents so as to minimize the disintegration of microcapsules on the transformation of medicine during tableting; and a stress scattering method in tableting. The use of the tableting composition according to the present invention enables tablets to be made without causing microencapsulated medicine powder, enzymes, germs or substances of a low melting point to be transformed or disintegrated.		
(71) Applicant (for all designated States except US): TAISHO PHARMACEUTICAL CO., LTD. [JP/JP]; 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).		
(72) Inventors; and:		
(75) Inventors/Applicants (for US only): YUASA, Hiroshi [JP/JP]; Higashigaoka Apartment Room 305, 12-1, Hatagaya 2-chome, Shibuya-ku, Tokyo 151 (JP). KANAYA, Yoshio [JP/JP]; 15-3, Nogata 5-chome, Nakano-ku; Tokyo 165 (JP). OMATA, Kazuki [JP/JP]; 22-6, Honchou 6-chome, Meguro-ku, Tokyo 152 (JP).		
(74) Agent: KITAGAWA, Tomizou; Taisho Pharmaceutical Co., Ltd., 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).		
(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US.		
Published With international search report.		

(21) Int. Application Number: PCT/US89/05798	(51) International Patent Classification ⁵ : A61K 9/70, A61L 15/00	(11) Int. Publication Number: WO 90/07328
(22) Int. Filing Date: 22 December 1989 (22.12.89)	A1	(43) Int. Publication Date: 12 July 1990 (12.07.90)
(30) Priority data: P 38 44 247.7 29 December 1988 DE (29.12.88)	(54) Title: APPLICATION SYSTEM FOR DRUG CONTAINING MICROEMULSIONS	
(57) Abstract		
The invention deals with devices, in particular with bandage strips, for a transdermal delivery of drugs to patients, whereby the drug formulations include highly viscous preparations, topical solutions of a low viscosity and micro-emulsions of a low viscosity containing the drugs. Depending on the consistency of the medium containing the drug, the drug formulation is stored in a reservoir, consisting, e.g., of a punched out cavity or of an absorbent piece of material, which is encased or supported by a carrier element (a formed material piece or a non-woven fleece tape) adhering to the skin by means of a skin-compatible adhesive, whereby specially formed protective films are applied at the filling and delivery side during the storage of the device to prevent a lateral migration, and whereby during its use, the device can be refilled with dosed amounts by the patient without requiring a removal of the device from the skin surface to be treated (Fig. 2).		
Published With international search report.		

<p>(21) Int. Application Number: PCT/DK90/00005</p>	<p>(51) International Patent Classification⁵: A61M 13/00, 15/00</p>	<p>(11) Int. Publication Number: WO 90/07351</p>																		
<p>(22) Int. Filing Date: 8 January 1990 (08.01.90)</p>	<p>A1</p>	<p>(43) Int. Publication Date: 12 July 1990 (12.07.90)</p>																		
<p>(30) Priority data:</p> <table border="0"> <tr> <td>65/89</td> <td>6 January 1989</td> <td>DK</td> </tr> <tr> <td></td> <td>(06.01.89)</td> <td></td> </tr> <tr> <td>659/89</td> <td>10 February 1989</td> <td>DK</td> </tr> <tr> <td></td> <td>(10.02.89)</td> <td></td> </tr> <tr> <td>4791/89</td> <td>28 September 1989</td> <td>DK</td> </tr> <tr> <td></td> <td>(28.09.89)</td> <td></td> </tr> </table>	65/89	6 January 1989	DK		(06.01.89)		659/89	10 February 1989	DK		(10.02.89)		4791/89	28 September 1989	DK		(28.09.89)		<p>(54) Title: AN ORAL INHALER</p>	
65/89	6 January 1989	DK																		
	(06.01.89)																			
659/89	10 February 1989	DK																		
	(10.02.89)																			
4791/89	28 September 1989	DK																		
	(28.09.89)																			
<p>(71)(72) Applicants and Inventors: SCHENK, Hans, Gernot [DK/DK]; Hovborgvej 11, Lindknud, DK-6650 Brørup (DK). PEDERSEN, Søren [DK/DK]; Vangen 17, DK-6000 Kolding (DK).</p>																				
<p>(74) Agent: PLOUGMANN & VINGTOFT; Sankt Annæ Plads 11, DK-1250 Copenhagen K (DK).</p>																				
<p>(81) Designated States: AT (European patent), AU, BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.</p>																				
<p>Published With international search report.</p>																				
<div> </div> <p>(57) Abstract</p> <p>An oral inhaler for use in inhaling a powdered or particulate medical product comprises a chamber (14) for containing the medical product, a mixing chamber (16), a gas flow passage (17) connected to the mixing chamber, and a pressure gas source or pumping device (40) for briefly providing in the gas flow passage a vigorous gas flow directed towards the mixing chamber. In order to obtain a high velocity of the gas flow, the gas flow passage (17) has nozzle-like restriction (18). The product chamber (14) is communicating with the gas flow passage (17) at the restriction (18) or adjacent thereto so as to draw product from the product chamber into the gas flow by ejector effect, whereby the product is disintegrated in small respirable particles, which are thoroughly mixed with the gas flow. A product reservoir (11) may be provided for containing a product supply sufficient for several inhalation procedures. The medical product may, for example, be transferred from a product reservoir to product chambers or metering chambers (14), which are defined in a rotatable cylinder or drum (38). The pressure gas source may be a pumping device, such as a piston pump. However, the pumping device preferably comprises a pumping chamber having a springy, diaphragm-like wall part (40).</p>																				

2026230630

Canadian Patent

[52] 167-159 [11] 1,238,275
[51] INT. CL.⁴A61K 9/06
[54] Menthol Enhancement of Transdermal
Drug Delivery
[54] Augmentation par le menthol de
l'absorption transdermique de
médicament
[72] Tsuk, Andrew G., U.S.A./E.-U.
[73] American Home Products Corporation,
U.S.A./E.-U.
[21] 470,941 [22] 841221
[30] U.S.A./E.-U. (564,654) 831222
Claims 5 Revendications

2026230631

BREVETS CANADIENS DÉLIVRÉS LE 17 JUILLET 1990

[52] 165-17 [51] 1,271,701
[51] INT. CL. A61L 9/03
[54] **Method and Apparatus of Vaporizing
Active Substances**
[54] **Méthode et dispositif de vaporisation
de substances actives**
[72] Morita, Masahiro; Tashiro, Kiyotomi,
Eguma, Chikashi; Suo, Osamu, Japan/
Japon
[73] Daiken Iko Kabushiki Kaisha, Japan/
Japon; Kabushiki Kaisha Fujiko, Japan/
Japon; Shiraimatsu Shinyaku Kabushiki
Kaisha,
Japan/Japon
[21] 531,024, [22] 870303
[30] Japan/Japon (47866/1986) 860304
Claims 16 Revendications

2026230632

Published Applications
DEMANDES CANADIENNES

[52] 128-64 [11] 2,005,151

[54] INTL.CL.³A61M-15/00; A61M-11/00

[54] Inhalator Device, in Particular a Pocket Inhalator

[54] Inhalateur de poche

[72] VanDer Linden, Klaus; Friedrich, Juergen; Zierenberg, Bernd, Germany (Federal Republic of)/Allemagne (Republique Federale de)

[73] Siemens Aktiengesellschaft and Boehringer Ingelheim KG, Germany (Federal Republic of)/Allemagne (Republique Federale de)

[22] 891211

[43] 900613

[30] EPO/EOB (88120823-5) 881213

[57] Claims 16 Revendications

2026230633

[*] SHAW, A.S.W.

UK 2,227,659(A)
8/8/90

Nicotine-containing lozenge

The lozenge is formed by compression of at least two mixed components, one of which a filler and the other a dispersion of nicotine and a fat or an essential oil, e.g. vanilla oil, in a carrier such as a silica preparation or a micro-cellulose material. [8 Pages including no Figure Pages] [9 Claims].
Priority: U.K. 6/12/88 28,468. (Appln. 6/12/89 27,618).

....

15-90

24

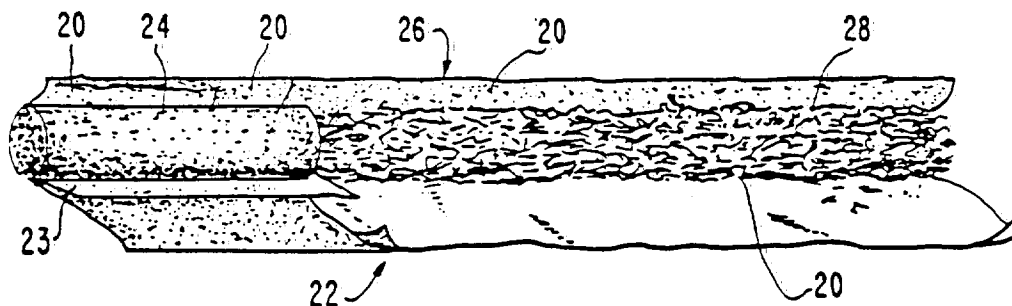
2026230634



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification⁴: A24B 15/30, A24C 5/47 A24D 1/02</p>	<p>(11) International Publication Number: WO 89/06911 (43) International Publication Date: 10 August 1989 (10.08.89)</p>
<p>(21) International Application Number: PCT/US88/00204 (22) International Filing Date: 28 January 1988 (28.01.88) (71) Applicant: C.A. BLOCKERS, INC. [US/US]; 2340 Meidinger Tower, Louisville Galleria, Louisville, KY 40202 (US). (72) Inventors: WADDELL, William, J.; 6604 Gunpowder Lane, Prospect, KY 40059 (US). MARLOWE, Carolyn; 6604 Gunpowder Lane, Propect, KY 40059 (US). KEENEY, L., Douglas; 54 Tepee Road, Louisville, KY 40207 (US). (74) Agents: BOLAND, Thomas, R. et al.; Vorys, Sater, Seymour & Pease, Suite 1111, 1828 L Street, N.W., Washington, DC 20036-5104 (US).</p>	<p>(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE, DE (European patent), DK, FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent).</p> <p>Published With international search report.</p> <p>RECEIVED PHILIP MORRIS MANAGEMENT CORP. LAW DEPT.-PATENT SECTION</p> <p>SEP 25 1989 NOTED J. Charles F. Friedman Ted Sander</p>

(54) Title: PROCESS FOR MANUFACTURING CIGARETTES EMPLOYING PRESELECTED ALCOHOLS



2026230635

(57) Abstract

A process for manufacturing cigarettes (22) which reduces health risks to smokers. According to this process redried cut rag tobacco (28) is sprayed with one or more preselected alcohols which are capable, when the vapors thereof are inhaled by the smoker, of inhibiting or blocking the selective localization of at least one nitrosamine and/or a metabolite thereof in the smoker's tissues such as those of the epithelial lining of his lungs. An example of such an alcohol is cyclohexanol in an ethyl alcohol solution. After the solution has been sprayed on the tobacco, the tobacco is machined in a conventional manner into the final cigarette (22), either filtered (24) or unfiltered. Upon smoking, the blocking alcohol is then heat released into the smoke stream, resulting in the desired blocking effect in the smoker, without noticeably altering the

A61K

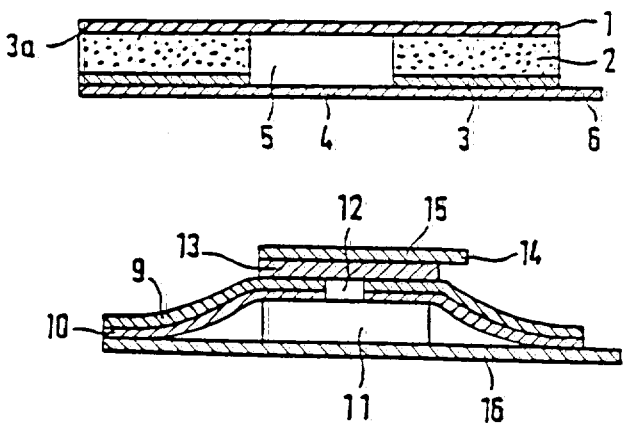
(21) Int. Application Number: PCT/JP89/01323	(51) International Patent Classification ⁵ : A61K 9/20	(11) Int. Publication Number: WO 90/07327
(22) Int. Filing Date: 28 December 1989 (28.12.89)	A1	(43) Int. Publication Date: 12 July 1990 (12.07.90)
(30) Priority data: 63/331821 28 December 1988 JP (28.12.88)	(54) Title: STRESS SCATTERING METHOD IN TABLETING	
(71) Applicant (for all designated States except US): TAISHO PHARMACEUTICAL CO., LTD. [JP/JP]; 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).	(57) Abstract This invention relates to a tableting composition containing minute gelatine balls and/or foams as stress scattering agents so as to minimize the disintegration of microcapsules or the transformation of medicine during tableting; and a stress scattering method in tableting. The use of the tableting composition according to the present invention enables tablets to be made without causing microencapsulated medicine powder, enzymes, germs or substances of a low melting point to be transformed or disintegrated.	
(72) Inventors; and:		
(75) Inventors/Applicants (for US only): YUASA, Hiroshi [JP/JP]; Higashigaoka Apartment Room 305, 12-1, Hatagaya 2-chome, Shibuya-ku, Tokyo 151 (JP). KANAYA, Yoshio [JP/JP]; 15-3, Nogata 5-chome, Nakano-ku, Tokyo 165 (JP). OMATA, Kazuki [JP/JP]; 22-6, Honchou 6-chome, Meguro-ku, Tokyo 152 (JP).		
(74) Agent: KITAGAWA, Tomizou; Taisho Pharmaceutical Co., Ltd., 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).		
(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US.		
Published With international search report.		

(21) Int. Application Number: PCT/US89/05798	(51) International Patent Classification ⁵ : A61K 9/70, A61L 15/00	(11) Int. Publication Number: WO 90/07328
(22) Int. Filing Date: 22 December 1989 (22.12.89)		(43) Int. Publication Date: 12 July 1990 (12.07.90)
(30) Priority data: P 38 44 247:7 29 December 1988 DE (29.12.88).	(54) Title: APPLICATION SYSTEM FOR DRUG CONTAINING MICROEMULSIONS	
(71) Applicant (for all designated States except US): RIKER LABORATORIES, INC. [US/US]; P.O. Box 33427, Saint Paul, MN 55133 (US).		
(72) Inventors: and		
(75) Inventors/Applicants (for US only): KRECKEL, Karl, W. [DE/DE]; Wilbecke 12-14, P.O. Box 1340, D-4280 Borken 1 (DE); ZERBE, Horst-Georg [DE/DE]; Wilhelm-Busch-Strasse 4, D-4281 Velen (DE).		
(74) Agents: SPRAGUE, Robert, W. et al.; Minnesota Mining and Manufacturing Company, P.O. Box 33427, St. Paul, MN 55133-3427 (US).		
(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.		
(57) Abstract The invention deals with devices, in particular with bandage strips, for a transdermal delivery of drugs to patients, whereby the drug formulations include highly viscous preparations, topical solutions of a low viscosity and micro-emulsions of a low viscosity containing the drugs. Depending on the consistency of the medium containing the drug, the drug formulation is stored in a reservoir, consisting, e.g., of a punched out cavity or of an absorbent piece of material, which is encased or supported by a carrier element (a formed material piece or a non-woven fleece tape) adhering to the skin by means of a skin-compatible adhesive, whereby specially formed protective films are applied at the filling and delivery side during the storage of the device to prevent a lateral migration, and whereby during its use, the device can be refilled with dosed amounts by the patient without requiring a removal of the device from the skin surface to be treated (Fig. 2).		
Published With international search report.		

2026230636

A61K

(21) Int. Application Number: PCT/JP89/01323	(51) International Patent Classification ⁵ :	(11) Int. Publication Number: WO 90/07327
(22) Int. Filing Date: 28 December 1989 (28.12.89)	A61K 9/20	A1
(30) Priority data: 63/331821 28 December 1988 JP (28.12.88)	(43) Int. Publication Date: 12 July 1990 (12.07.90)	
(71) Applicant (for all designated States except US): TAISHO PHARMACEUTICAL CO., LTD. [JP/JP]; 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).	(54) Title: STRESS SCATTERING METHOD IN TABLETING	
(72) Inventors; and:	(57) Abstract	
(75) Inventors/Applicants (for US only): YUASA, Hi- roshi [JP/JP]; Higashigaoka Apartment Room 305, 12-1, Hatagaya 2-chome, Shibuya- ku, Tokyo 151 (JP). KANAYA, Yoshio [JP/JP]; 15-3, Nogata 5-chome, Nakano-ku, Tokyo 165 (JP). OMATA, Kazuki [JP/JP]; 22-6, Honchou 6-chome, Meguro-ku, Tokyo 152 (JP).	This invention relates to a tableting composition containing minute gelatine balls and/or foams as stress scattering agents so as to minimize the disintegration of microcapsules or the transformation of medicine during tableting; and a stress scattering method in tableting. The use of the tableting composition according to the present invention enables tablets to be made without causing microencapsulated medicine powder, enzymes, germs or substances of a low melting point to be transformed or disintegrated.	
(74) Agent: KITAGAWA, Tomizou; Taisho Pharm- aceutical Co., Ltd., 24-1, Takata 3-chome, Toshima-ku, Tokyo 171 (JP).		
(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), ES (European pa- tent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), US.		
Published With international search report.		

(21) Int. Application Number: PCT/US89/05798	(51) International Patent Classification ⁵ :	(11) Int. Publication Number: WO 90/07328
(22) Int. Filing Date: 22 December 1989 (22.12.89)	A61K 9/70, A61L 15/00	A1
(30) Priority data: P 38 44 247.7 29 December 1988 DE (29.12.88)	(43) Int. Publication Date: 12 July 1990 (12.07.90)	
(71) Applicant (for all designated States except US): RIKER LABORATORIES, INC. (US/US); P.O. Box 33427, Saint Paul, MN 55133 (US).	(54) Title: APPLICATION SYSTEM FOR DRUG CONTAINING MICROEMULSIONS	
(72) Inventors; and:		
(75) Inventors/Applicants (for US only): KRECKEL, Karl, W. (DE/DE); Wilbecke 12-14, P.O. Box 1340, D-4280 Borken 1 (DE). ZERBE, Horst-Georg (DE/DE); Wilhelm-Busch- Strasse 4, D-4281 Velen (DE).	(57) Abstract	
(74) Agents: SPRAGUE, Robert, W. et al.; Minne- sota Mining and Manufacturing Company, P.O. Box 33427, St. Paul, MN 55133-3427 (US).	The invention deals with devices, in particular with bandage strips, for a transdermal delivery of drugs to patients, whereby the drug formulations include highly viscous preparations, topical solutions of a low viscosity and micro-emulsions of a low viscosity containing the drugs. Depending on the consistency of the medium containing the drug, the drug formulation is stored in a reservoir, consisting, e.g., of a punched out cavity or of an absorbent piece of material, which is encased or supported by a carrier element (a formed material piece or a non-woven fleece tape) adhering to the skin by means of a skin-compatible adhesive, whereby specially formed protective films are applied at the filling and delivery side during the storage of the device to prevent a lateral migration, and whereby during its use, the device can be refilled with dosed amounts by the patient without requiring a removal of the device from the skin surface to be treated (Fig. 2).	
(81) Designated States: AT (European patent), AU, BE (European patent), CH (European pa- tent), DE (European patent), ES (European patent), FR (European patent), GB (Euro- pean patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.		
Published With international search report.		

with said essential oil-containing herb which maintains said herb in a moist coherent cud during chewing.

2. The chewing composition of claim 1 which further comprises a flavorant and a coloring agent.

3. The chewing composition of claim 2 wherein said flavor component is selected from the group consisting of natural and artificial sweeteners, flavoring agents, spices, fruit flavors, and mixtures thereof.

4. The chewing composition of claim 2 wherein said color component is selected from the group consisting of carmel and other food grade coloring agents.

5. The chewing composition of claim 2 wherein said herb component is present in the composition of the final product in an amount of from about 40% to about 60% by weight, said casing component is present in an amount of from about 8% to about 15% by weight, said flavor component is present in an amount from about 4% to about 26% by weight, and said color component is present in an amount of from about 0.25% to about 5% by weight.

6. The chewing composition of claim 5 wherein said herb component is present in an amount of about 45% to about 55% by weight, said casing component is present in an amount of from about 15% to about 28% by weight, said flavor component is present in an amount of about 8% to about 20% by weight, and said color component is present in an amount of about 0.8% to about 3.0% by weight.

7. The chewing composition of claim 1 wherein said preservative is selected from the group consisting of a salt, powdered dandelion root, echinacea, clove powder, and mixtures thereof.

8. The chewing composition of claim 1 wherein said binder is selected from a group consisting of molasses, corn syrup, hydrogenated starch hydrolysates, and mixtures thereof.

9. The chewing composition of claim 1 wherein said humectant is selected from the group consisting of glycerin, sorbitol, invert sugar, and other moisture-maintaining materials.

10. The chewing composition of claim 1 which further comprises a bio-affecting agent.

11. The chewing composition of claim 10 wherein said bio-affecting agent is selected from the group consisting of mineral supplements, analgesics, antipyretics, antiarrhythmics, ion exchange resins, appetite suppressants, vitamins, anti-inflammatory substances, coronary dilators, cerebral dilators, peripheral vasodilators, anti-infectives, psychotropics, antimanics, stimulants, antihistamines, laxatives, decongestants, gastro-intestinal sedatives, antidiarrheal preparations, anti-anginal drugs, vasodilators, anti-hypertensive drugs, vasoconstrictors and migraine treatments, antibiotics, tranquilizers, antipsychotics, antitumor drugs, anticoagulants and antithrombotic drugs, hypnotics, sedatives, anti-emetics, anti-nauseants, anticonvulsants, neuromuscular drugs, hyper and hypoglycaemic agents, thyroid and antithyroid preparations, diuretics, antispasmodics, uterine relaxants, nutritional additives, antiobesity drugs, anabolic drugs, erythropoietic drugs, antiasthmatics, expectorants, cough suppressants, nucleolytics, antineoplastic drugs and mixtures thereof.

12. A snuff composition comprising a nicotine-free herb containing essential oils capable of being encased and capable of being processed to a texture which is non-injurious to the surface of the oral cavity, said herb being clover, and a casing material which includes a preservative, a binder, and a humectant for combining

with said essential oil-containing herb which maintains said herb in a moist coherent cud in the mouth during use.

13. The snuff composition of claim 12 wherein said herb is hydrophilic and wherein said casing is adsorptive to said herb.

14. The snuff composition of claim 13 wherein said herb is red clover.

15. The snuff composition of claim 12 wherein said herb component is present in the final product in an amount of from about 25% to about 45% by weight, and said casing component is present in an amount of from about 35% to about 65% by weight.

16. The snuff composition of claim 15 wherein said herb component is present in an amount of from about 30% to about 40%, and said casing component is present in an amount of from about 40% to about 60%.

17. The snuff composition of claim 16 wherein said herb component is present in an amount of from about 32% to about 37% by weight, and said casing component is present in an amount of from about 45% to about 55% by weight.

18. The snuff composition of claim 12 wherein said preservative is selected from the group consisting of a salt, powdered dandelion root, echinacea, clove powder and mixtures thereof.

19. The snuff composition of claim 12 wherein said binder is selected from the group consisting of molasses, corn syrup, hydrogenated starch hydrolysates and mixtures thereof.

20. The snuff composition of claim 12 wherein said humectant is selected from the group consisting of glycerin, sorbitol, invert sugar, and other moisture-maintaining materials.

21. The snuff composition of claim 12 which further comprising a flavorant component, a color component, and an additional non-casing herbal binder component.

22. The snuff of claim 21 wherein said flavor component is present in an amount of from about 0.25% to about 7% by weight, said color component is present in an amount of from about 0.25% to about 5% by weight, and said additional binder component is present in an amount of from about 0.5% to about 5% by weight.

23. The snuff composition of claim 22 wherein said flavor component is present in an amount of from about 1.2% to about 5% by weight, said color component is present in an amount of from about 0.8% to about 3% by weight, and said additional binder component is present in an amount of from about 0.8% to about 3% by weight.

24. The snuff composition of claim 23 wherein said flavor component is present in an amount of from about 2.5% to about 4% by weight, said color component is present in an amount of from about 1.0% to about 1.3% by weight, and said additional binder component is present in an amount of from about 0.1% to about 2.0% by weight.

25. The snuff composition of claim 21 wherein said herbal binder component comprises an ingredient selected from the group consisting of gums, slippery elm, mallow, and mixtures thereof.

26. The process of claim 25 wherein said final moisture level is from about 19% to about 21%.

27. The snuff composition of claim 21 wherein said flavor component is selected from the group consisting of natural and artificial sweeteners, flavor agents, fruit flavors, spices, and mixtures thereof.

2026230637

United States Patent [19]
Summers

[11] Patent Number: 4,817,640
[45] Date of Patent: Apr. 4, 1989

[54] HERBAL CHEW AND SNUFF
COMPOSITIONS

[75] Inventor: John K. Summers, Anderson, Ind.
[73] Assignee: Better Life International Life, Inc.,
Stuart, Fla.

[21] Appl. No.: 907,402

[22] Filed: Sep. 12, 1986

[51] Int. Cl.⁴ A24B 15/18

[52] U.S. Cl. 131/359; 131/352;
131/369

[58] Field of Search 131/359, 369

[56] References Cited

U.S. PATENT DOCUMENTS

92,497 7/1860 Webster .
107,693 9/1879 Kilbourn .
111,711 2/1871 Wright .
160,138 2/1875 Appleby .
166,155 7/1875 Sterry .
210,538 12/1878 James .
448,925 3/1891 Miller .
2,298,532 10/1941 Franich .
2,930,720 3/1960 Finberg 131/359
3,067,068 12/1962 Finberg .
3,369,551 2/1968 Carrall 131/359
3,747,607 7/1973 Kim 131/359

FOREIGN PATENT DOCUMENTS

842 of 1776 United Kingdom .
2427 of 1859 United Kingdom .
981137 1/1965 United Kingdom .

OTHER PUBLICATIONS

"Herbal Smoking Substitutes for Tobacco," pp.
141-150, year and author unknown.

Primary Examiner—V. Mullin

Assistant Examiner—J. Cheng

Attorney, Agent, or Firm—Hoffmann & Baron

[57] ABSTRACT

Compositions and methods for providing tobaccoless herbal chew and snuff products which include an herbal component capable of being encased with a casing material providing a coherent cud in the oral cavity during use. In particular the present invention contemplates the use of a nicotine-free herbal substitute, such as red clover in the case of snuff and dandelion leaf in the case of chew, which can be encased with, among other things, a binder to provide a coherent cud in the mouth during use. As a result of this invention, safe nicotine-free snuff and chew compositions can be provided.

39 Claims, No Drawings

2026230638

United States Patent [19]
Ray et al.

[11] Patent Number: 4,800,903
[45] Date of Patent: Jan. 31, 1989

[54] NICOTINE DISPENSER WITH POLYMERIC
RESERVOIR OF NICOTINE

[76] Inventors: Jon P. Ray, 12544 Judson Rd., San
Antonio, Tex. 78233; James E.
Turner, 307 Wayside, San Antonio,
Tex. 78213; Michael P. Ellis, 811
River Rd., San Antonio, Tex. 78212;
Ronald G. Oldham, 1410 Tarton, San
Antonio, Tex. 78231

[21] Appl. No.: 738,120

[22] Filed: May 24, 1985

[51] Int. Cl.⁴ A24D 1/00; A24D 3/08;
A24F 1/00

[52] U.S. Cl. 131/273; 131/270;
131/335; 128/202.21

[58] Field of Search 131/332, 270, 273, 331,
131/335, 343, 341; 128/202.21

[56] References Cited

U.S. PATENT DOCUMENTS

3,229,008 1/1966 Harrington et al. 131/343
3,393,685 7/1968 Mumpowes et al. 131/341
4,189,511 2/1980 Levers et al. 131/332

FOREIGN PATENT DOCUMENTS

2149190 4/1978 Fed. Rep. of Germany .

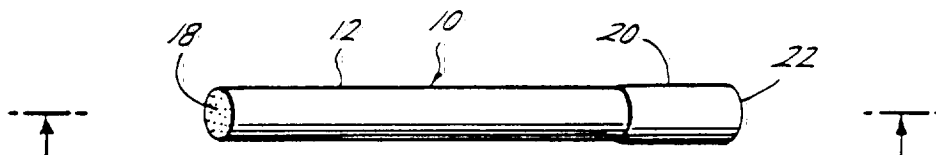
Primary Examiner—V. Millin

Attorney, Agent, or Firm—Arnold, White & Durkee

[57] ABSTRACT

A nicotine dispenser comprising a polyolefin porous plug with reversibly retained nicotine therein. The dispenser is mounted in a tubular configuration to provide a cigarette-shaped product adapted to dispense nicotine vapor when air is drawn therethrough. The polymeric reservoir of nicotine comprises a polyolefin, preferably polyethylene or polypropylene, which reversibly absorbs nicotine.

39 Claims, 1 Drawing Sheet



RECEIVED
PHILIP MORRIS MANAGEMENT CORP.
LAW DEPT.—PATENT COUNCIL

FEB 8 1989

2026230639

2026230640

APPENDIX N

Resource Allocations

By Program

2026230641

DIRECT 1990	Proj Tot'	Percent Admin	Ard	Bcr	Cad	Chm	Cigdev	Cigtec	Ctsd	Deveng	Fladev	Red	Phy	STS/TA	Tis	Tobfun	Tobmatl	Tobpf	Ex/Admin
OPERATIONS SUPPORT	63.35	0.15						0.00											
Cigarette Monitoring		1.53		0.50			0.03		0.50										0.5
Materials Evaluation		8.28		4.00		0.05	0.03	3.00	0.00										1.2
Customer Complaints-T/O/S		1.83		1.00			0.03	0.70				0.10							
Flavor Dev/Analytical Sup		1.83					0.03					0.60		0.10					1.1
Alt Humectants/Preserv		5.28	0.50	4.35			0.03					0.10					0.10		0.2
Micro Quality Improv		2.68		2.55			0.03												0.1
Env Compliance/Mono Inks		3.88					0.03						3.00	0.75					0.1
Semiworks Support		17.13					0.03		2.00			0.10							15
Burley Spray/Dry Flavors		0.53					0.03					0.10							0.3
Flavor Specs/Certs		7.03	3.00				0.03		3.00			0.50					0.10		0.5
Environmental Tob Smok		2.03		2.00			0.03												
Entomological Support		6.28		4.25			0.03												
Project Warhol		0.73		0.50			0.03											0.20	
Engineering Stud/Methods		2.03		1.50			0.03		0.50										
Recon Sheet Certification		0.73		0.50			0.03					0.10						0.10	
Cooperative Leaf Studies		1.53		1.00		0.50	0.03												
PROJECT TOMORROW	7.60	7.60	0.02			0.35	1.00	0.55	0.50				2.50	0.00			0.70		2
OPTICAL PROCESSING	5.75	5.75	0.01										5.50	0.10					0.15
NEW EXPANSION PROCESS	23.15	23.15	0.06	1.00		0.20						0.85	5.00	0.60		9.00	4.50		2
CAST SHEET RCB PROCESS	9.40	9.40	0.02	1.50				0.30	0.50			0.70		0.60			4.80		1
PROJECT ART	48.65		0.12																
Art Sup of Current proc		28.22		5.50	1.60		1.05	1.00	0.60	1.00		1.37		1.50			5.90		8.7
Art Process Development		20.43		10.00		0.30	1.05					1.38					7.70		
Art Total		0.00																	
PROJECT DELTA/SIGMA/BETA	35.80	35.80	0.09	0.50		0.50	0.10		11.00			2.50		13.00	1.80		5.20	0.30	0.9
TSNA	19.20	19.20	0.05				0.10												
LHA	14.35	14.35	0.03	0.50	19.10		0.10												
REDUCED SS/PAPER TECH	36.65	36.65	0.09	7.00	13.75		0.10												
PROJECT AMBROSIA/ASH TRAY ODOR	7.35	7.35	0.02	1.00	1.10		0.50	4.05				0.75		1.00	0.90		2.40		2.95
PROJECT PACT	2.80	2.80	0.01	1.00	0.20		1.50	1.00				0.75			0.10		0.50	1.00	0.2
LOW TAR/HIGH FLAVOR	9.35	9.35	0.02	1.00	0.60		0.95	2.00	1.50	0.50		2.00			0.80				0.8
FILTER RESEARCH	8.45		0.02																
Domestic		6.95		0.50			0.05		3.00	0.50		0.30		1.50			0.60		0.5
International		1.50						1.50											
DOMESTIC PRODUCT DEVELOPMENT	58.55	58.55	0.14	0.50		0.30	3.25	1.85	14.00			3.05	23.30		1.00		1.50		9.8
INTERNATIONAL PRODUCT SUPPORT	62.05																		
PM USA		17.05	0.04	1.50		0.30	0.20		1.30	2.00		1.95	1.00						8.8
PM PI		45.00						19.00		22.00		2.00	2.00						0.8
PROJECT NATURAL	1.50	1.50	0.00				0.50					0.20							
INGREDIENTS	2.00	2.00	0.00												2.00				
ENVIRONMENTAL ISSUES	5.55	5.55	0.01	5.00			0.25					0.20			0.10				
MENTHOL	6.00	6.00	0.01				0.90	0.50	0.30	0.50		1.00	0.50			0.30	2.00		0.5
REDUCED TAR & NICOTINE INTL	1.70	1.70	0.00					0.50	0.50			0.20							
SELECTIVE FILTRATION	1.40	1.40	0.00					0.40						1.00					
NEW PACKAGING CONCEPTS	0.20	0.20	0.00					0.20											
PROCESS DEV STUDIES	1.90	1.90	0.00														1.00		0.9
COMBUSTION RESEARCH	0.60		0.00																
Mass Burn Control		0.60				0.10							0.50						
Pyrolysis Temp Control		0.00																	
FLAVORS	6.05		0.01																
Thermal Flavor Release		3.09		1.00			1.44	0.45				0.20							
Flavor Formation Studies		1.32					0.32					1.00							
Fragrances		0.52					0.32					0.20							
Volatile Flavors		1.12					0.32					0.80							
AEROSOLS	4.65		0.01																
Formation Mechanisms		3.65				1.00	1.35	0.30					1.00						
Short Lived Aerosols		1.00											1.00						
SELECTIVE SEPARATIONS	2.45		0.01																
Supercritical Technology		2.00		1.00										1					
Membrane Separation		0.45					0.45												
CONSUMER TESTING RESEARCH	2.50		0.01																
Regression Based Mod of Lik		1.50											1.50						
Stochastic Discrimination Mo		0.30											0.30						

2026230642

	Proj Tot	Percent Admin	Ard	Bcr	Cad	Chm	Cigdev	Cigtec	Ctsd	Deveng	Fladev	Ped	Phy	STS/TA	Tis	Tobfun	Tobmati	Tobpf	Ex/Admin
DIRECT 1990																			
Cost/Benefit Eval	0.50																		
Quant Mod of Market Dynamics	0.20												0.50						
CHEMICAL SENSES	1.85	0.00											0.20						
Electrophysiological Stud	1.60				1.20	0.40													
Trigeminal Stud	0.20				0.20														
Odor Panel	0.00																		
Room Odor Panel	0.00																		
Flav Response/ Chm Aspects	0.00																		
Struct-Act Relationships	0.05														0.05				
MEAS & SENS OF PHY & CHM CHAR	2.50	0.01	1.50										1.00						
Process Control Sys	0.00																		
BIOLOGICAL	3.20	0.01																	
Bioconversion	1.55				1.50	0.05													
Antibodies	1.65				1.60	0.05													
Biosensors	0.00																		
COMPUTING SYSTEMS	2.80	0.01																	
Expert Sys & Neural Net	2.80				2.00			0.50				0.20		0.10					
Optical Computing	0.00																		
BASIC ANALYTICAL RESEARCH	1.50	0.00	1.50																
New Project 1	0.00																		
New Project 2	0.00																		
New Project 3	0.00																		
New Project 4	0.00																		
New Project 5	0.00																		
		1.00																	
Total Support	161.20		28.00	0.00	0.00	28.40	2.70	0.00	0.00	11.00	28.00	0.00	0.00	0.00	0.00	0.00	9.10	0.00	43.00
Total Direct	415.80		0.00	58.00	52.00	4.60	28.30	11.00	33.00	26.00	0.00	21.00	27.00	39.00	9.00	0.00	15.00	32.90	59.00
Total Direct & Support	577.00		28.00	58.00	52.00	33.00	31.00	11.00	33.00	37.00	28.00	21.00	27.00	39.00	9.00	11.00	15.00	42.00	59.00
Allocated Total	0.00																		

2026230643

DIRECT 1991	TOTAL	ADMIN	ARD	BCR	CAD	CHM	CIGDEV	CIGTEC	CTSD	DEVENG	FLADEV	PED	PHY	STS-TA	TIS	TOBFUN	TOBMATL	TOBPF	EX/ADMIN
OPERATIONS SUPPORT									0.00										
Adhesives	2.60		2.00								0.20								0.40
Cigarette Monitoring	1.20								0.50		0.10								0.10
Materials Evaluation	5.20		3.50			0.05	0.25	0.00						0.20					1.20
Customer Complaints-T/O/S	1.90		1.00					0.70			0.10			0.10					
Flavor Dev/Analytical Sup	1.40										0.20			0.10					1.10
Marlboro Standardization	5.75		1.00				0.25		3.00		1.00								0.50
Alt Humectants/Preserv	1.55			1.25							0.10								0.20
Micro Quality Improv	4.20			4.10															0.10
Monogram Inks	1.00												1.00						
Packaging - Inks & Solvents	3.95		1.00					2.75			0.20								
Semiworks Support	17.10								2.00		0.10								15.00
Burley Spray/Dry Flavors	0.40										0.10								0.30
Flavor Specs/Certs	2.30		1.50								0.60			0.20					
ETS Studies	1.10		1.00											0.10					
Entomological Support	5.30		1.00	4.30															
Project Warhol	0.00			0.00															
Engineering Stud/Methods	3.00		2.50						0.50		0.00								
Recon Sheet Certification	0.00										0.00								
Cooperative Leaf Studies	2.00		1.50			0.50													
Environmental Issues	6.00		4.50	1.00							0.30			0.10					0.10
PROJECT TOMORROW	15.45		1.00		0.20	0.35	2.00	1.25	0.50	0.20	1.25		6.50	0.20					2.00
OPTICAL PROCESSING	6.35									0.20			6.00						0.15
NEW EXPANSION PROCESS	36.95		3.00		0.20					3.50	0.85		8.00	0.70		11.70	7.00		2.00
CAST LEAF RCB PROCESS	13.80		2.00						0.50	0.80	0.70			0.40			8.40		1.00
PROJECT ART									0.00										
Art Sup of Current proc	19.60		3.00	0.25		1.05	1.00	0.25		0.40	0.25		0.50				3.20		8.70
Art Process Development	17.25		4.00	0.40	0.20	1.05			1.00	1.10	1.00		0.50				9.00		
Art Total																			
PROJECT BETA	28.75		2.00		0.40	0.10				1.70	0.25		21.00			3.30			
PROJECT SIGMA	1.00							0.10			0.00								0.90
TSNA	18.50			18.40		0.10													
LBA	11.20		0.50	10.40		0.10								0.20					
REDUCED SS/PAPER TECH	36.85		6.50	1.10	0.20	13.00	0.25	11.25			0.60			1.00					2.95
PROJECT AMBROSIA/ASH TRAY ODOR	8.25		2.00	0.10		2.10	1.75	1.00			1.00			0.10					0.20
PROJECT PACT	2.70									0.40			0.50	0.80			1.00		
LOW TAR/HIGH FLAVOR	10.60		1.00	1.50		0.95	2.00	1.00	0.50		2.35						0.50		0.80
FILTER RESEARCH	0.00										0.00								0.00
Domestic	5.55		0.50		0.20	0.05		3.00	0.50		0.30		0.50						0.50
International	1.50							1.50			0.00								
DOMESTIC PRODUCT DEVELOPMENT	61.20		1.00		0.30		4.00	1.75	14.00		4.15	24.30		0.90			1.00		9.80
INTERNATIONAL PRODUCT SUPPORT	0.00																0.00		0.00
PM USA	17.80		1.50		0.30	0.20		1.50	2.00		2.00	1.00					0.50		8.80
PM FI	41.00						15.00		22.00		0.20	2.00							
PROJECT NATURAL	1.50						0.50												0.80
INGREDIENTS	2.80			0.20															
MENTHOL	5.90					0.90	0.50	0.30	0.50	1.20	2.00			2.60			0.50		
REDUCED TAR & NICOTINE INTL	1.70							0.50	0.50		0.20								0.50
SELECTIVE FILTRATION	2.40		1.50					0.40					0.50						
NEW PACKAGING CONCEPTS	0.20							0.20											
PROCESS DEV STUDIES	2.00							1.10								0.00			0.90
COMBUSTION RESEARCH																			
Mass Burn Control	1.10					0.10							1.00						
Pyrolysis Temp Control	0.00																		
FLAVORS																			
Thermal Flavor Release	3.35		0.50				1.60	0.25			1.00								
Flavor Formation Studies	1.20						0.20				1.00								
Fragrances	0.25						0.20				0.05								
Volatile Flavors	0.85						0.40				0.45								
AEROSOLS																			
Formation Mechanisms	4.55				1.00	1.35		0.20					2.00						
Short Lived Aerosols	1.00												1.00						
SELECTIVE SEPARATIONS																			
Supercritical Technology	2.40		2.00	0.40															

2026230644

	TOTAL	ADMIN	ARD	BCR	CAD	CHM	CIGDEV	CIGTEC	CTSD	DEVENG	FLADEV	RED	PHY	STS-ETA	TIS	TOBFUN	TOBMATL	TOBPF	EX/ADMIN
DIRECT 1991																			
Membrane Separation	0.45																		
CONSUMER TESTING RESEARCH																			
Regression Based Mod of Lik	1.50											1.50							
Stochastic Discrimination Mo	0.50											0.50							
Cost/Benefit Eval	0.50											0.50							
Quant Mod of Market Dynamics	0.20											0.20							
CHEMICAL SENSES																			
Electrophysiological Stud	0.60			0.60		0.00													
Trigeminal Stud	0.25			0.25															
Odor Panel	0.40					0.40													
Room Odor Panel	0.00																		
Flav Response/Chm Aspects	0.80		0.50												0.30				
Struct-Act Relationships	0.20			0.20															
MEAS & SENS OF PHY & CHM CHAR																			
Process Control Sys	1.00		1.00																
BIOLOGICAL																			
Bioconversion	3.25		1.00	2.20		0.05													
Antibodies	0.75			0.70		0.05													
Biosensors	1.30			1.30															
COMPUTING SYSTEMS																			
Expert Sys & Neural Net	2.00				2.00														
Optical Computing	0.00																		
BASIC ANALYTICAL RESEARCH	2.00		2.00																
Plant Tissue Culture	1.35			1.35															
Processing Plt Sup	0.40			0.00						0.40					0.00		0.00		
Biochemical Processing	0.00														0.00				
Alpha	0.00																		
Primary Improv	4.00																		
Recon Plt Sup	2.90																		
Total Support	142.20	29.00	1.00	0.00	28.00	2.70	0.00	0.00	11.00	16.50	0.00	0.00	0.00	0.00	11.00	0.00	0.00	0.00	43.00
Total Direct	434.80	0.00	57.00	50.00	5.00	25.30	13.00	29.00	26.00	9.50	23.00	28.00	49.00	8.00	0.00	15.00	38.00	59.00	0.00
Total Direct & Support	577.00	29.00	58.00	50.00	33.00	28.00	13.00	29.00	37.00	26.00	23.00	28.00	49.00	8.00	11.00	15.00	38.00	59.00	43.00
	577.00																		
	434.80																		

2026230645

DIRECT 1992	TOTAL	ADMIN	ARD	BCR	CAD	CHM	CIGDEV	CIGTEC	CTSD	DEVENG	FLADEV	PED	PHY	STS-TA	TIS	TOBFUN	TOBMATL	TOBPF	EX/ADMIN
OPERATIONS SUPPORT									0.00										
Adhesives	4.60		4.00								0.20								0.40
Cigarette Monitoring	1.20								0.50		0.10								0.10
Materials Evaluation	5.20		3.50			0.05	0.25	0.00						0.20					1.20
Customer Complaints/T/O/S	1.90		1.00					0.70						0.10					0.10
Flavor Dev/Analytical Sup	1.90										0.70			0.10					1.10
Marlboro Standardization	5.75		1.00				0.25		3.00		1.00								0.50
Alt Humectants/Preserv	0.30			0.00							0.10								0.20
Micro Quality Improv	6.10			6.00															0.10
Monogram Inks	0.00																		
Packaging - Inks & Solvents	3.95		1.00					2.75			0.20								
Semiworks Support	17.10								2.00		0.10								15.00
Burley Spray/Dry Flavors	0.40										0.10								0.30
Flavor Specs/Certs	1.30		0.50								0.60								
ETS Studies	1.10		1.00											0.20					
Entomological Support	4.20		1.00	3.20										0.10					
Project Warhol	0.00			0.00															
Engineering Stud/Methods	3.00		2.50						0.50		0.00								
Recon Sheet Certification	0.00										0.00								
Cooperative Leaf Studies	2.00		1.50				0.50												
Environmental Issues	12.85		5.00	1.50			1.00		1.00		0.30		1.00	0.30		1.50	1.00		0.25
PROJECT TOMORROW	17.95		2.00		0.20	0.35	2.50	1.50	0.50	0.20	1.50		7.00	0.20		1.00			1.00
OPTICAL PROCESSING	6.50									0.20			6.00						0.30
NEW EXPANSION PROCESS	28.30		3.00		0.20					3.50	0.60		6.00	0.80		8.20	4.00		2.00
CAST LEAF RCB PROCESS	21.25		2.00						1.00	0.80	0.50			0.50			15.60		0.85
PROJECT ART									0.00										
Art Sup of Current proc	9.40		0.00	0.00		0.00	0.50	0.25	0.00	0.40	0.25						0.50		7.50
Art Process Development	16.85		3.00	0.50	0.20	1.05			0.00	1.10	1.00						10.00		
Art Total																			
PROJECT BETA	33.50		3.00		0.40	0.10				0.70	1.00		25.00			3.30			
PROJECT SIGMA	0.80							0.00			0.00								0.80
TSNA	18.45		0.50	17.85		0.10													
LBA	9.80		0.50	9.00		0.10								0.20					
REDUCED SS/PAPER TECH	36.35		6.00	1.50	0.20	12.00	0.25	12.25			0.25			1.00					2.90
PROJECT AMBROSIA/ASH TRAY ODOR	8.65		2.50	0.10		2.10	1.75	1.00			0.80			0.10					0.30
PROJECT PACT	0.60									0.00				0.60			0.00		
LOW TAR/HIGH FLAVOR	9.20		1.00	1.00		0.95	2.00	1.00	0.00		2.35								0.90
FILTER RESEARCH	0.00																		0.00
Domestic	7.30		0.50		0.20	1.10		3.00	0.50		0.30		1.00						0.70
International	1.50							1.50			0.00								
DOMESTIC PRODUCT DEVELOPMENT	63.60		1.00		0.30		3.75	2.00	14.00		4.55	24.30		0.90		1.00	1.00	10.80	
INTERNATIONAL PRODUCT SUPPORT	0.00																0.00		0.00
PM USA	20.05		1.50		0.30	0.20		1.75	2.00		3.00	1.00					0.50		9.80
PM PI	41.00						15.00	0.50	22.00		2.00	2.00							0.60
PROJECT NATURAL	1.30										0.20								
INGREDIENTS	2.90			0.50										2.40					
MENTHOL	6.15					0.90	0.75	0.30	0.50	1.20	2.00						0.50		
REDUCED TAR & NICOTINE INTL	1.70							0.50	0.50		0.20								0.50
SELECTIVE FILTRATION	4.25		1.50			1.00		0.75					1.00						

2026230646

	TOTAL	ADMIN	ARD	BCR	CAD	CHM	CIGDEV	CIGTEC	CTSD	DEVENG	FLADEV	PED	PHY	STS-TA	TIS	TOBFUN	TOBMATL	TOBPF	EX/ADMIN
DIRECT 1992																			
NEW PACKAGING CONCEPTS	0.20																		
PROCESS DEV STUDIES	2.00																		
COMBUSTION RESEARCH								1.10								0.00		0.90	
Mass Burn Control	1.10		0.00			0.10							1.00						
Pyrolysis Temp Control	2.00		1.00			1.00													
FLAVORS																			
Thermal Flavor Release	3.85		1.00			1.60		0.25			1.00								
Flavor Formation Studies	1.20					0.20					1.00								
Fragrances	0.25					0.20					0.05								
Volatile Flavors	0.85					0.40					0.45								
AEROSOLS																			
Formation Mechanisms	4.55				1.00	1.35		0.20					2.00						
Short Lived Aerosols	1.00												1.00						
SELECTIVE SEPARATIONS																			
Supercritical Technology	3.10		3.00	0.10															
Membrane Separation	0.45					0.45													
CONSUMER TESTING RESEARCH																			
Regression Based Mod of Lik	1.50											1.50							
Stochastic Discrimination Mo	0.50											0.50							
Cost/Benefit Eval	0.50											0.50							
Quant Mod of Market Dynamics	0.20											0.20							
CHEMICAL SENSES																			
Electrophysiological Stud	1.00			1.00		0.00													
Trigeminal Stud	0.75			0.75															
Odor Panel	0.40					0.40													
Room Odor Panel	0.00																		
Flav Response/ Chm Aspects	1.80		1.00	0.50										0.30					
Struct-Act Relationships	0.50			0.50															
MEAS & SENS OF PHY & CHM CHAR																			
Process Control Sys	1.00		1.00																
BIOLOGICAL																			
Bioconversion	3.05		1.00	2.00		0.05													
Antibodies	1.05			1.00		0.05													
Biosensors	2.00			2.00															
COMPUTING SYSTEMS																			
Expert Sys & Neural Net	2.00				2.00														
Optical Computing	0.00																		
BASIC ANALYTICAL RESEARCH	2.00		2.00																
Plant Tissue Culture	2.00			2.00															
Processing Plt Sup	0.50			0.00							0.50				0.00		0.00		
Biochemical Processing	0.00														0.00				
Alpha	0.00																		
Primary Improv	3.00																3.00		
Recon Plt Sup	1.90																1.90		
Total Support	143.60	29.00	1.00	0.00	28.00	2.70	0.00	0.00	11.00	17.90	0.00	0.00	0.00	0.00	11.00	0.00	0.00	0.00	43.00
Total Direct	445.40	0.00	60.00	51.00	5.00	27.30	13.00	31.00	26.00	8.10	25.00	28.00	51.00	8.00	0.00	15.00	38.00	59.00	0.00
Total Direct & Support	589.00	29.00	61.00	51.00	33.00	30.00	13.00	31.00	37.00	26.00	25.00	28.00	51.00	8.00	11.00	15.00	38.00	59.00	43.00
	589.00																		

2026230647

DIRECT 1993	TOTAL	ADMIN	ARD	BCR	CAD	CHM	CIGDEV	CIGTEC	CTSD	DEVENG	FLADEV	PED	PHY	STS-TA	TIS	TOBFUN	TOBMATL	TOBPF	EX/ADMIN
OPERATIONS SUPPORT									0.00										
Adhesives	4.60		4.00								0.20							0.40	
Cigarette Monitoring	1.20						0.50		0.50		0.10							0.10	
Materials Evaluation	4.70		3.00			0.05	0.25	0.00						0.20				1.20	
Customer Complaints-T/O/S	1.90		1.00					0.70						0.10				0.10	
Flavor Dev/Analytical Sup	2.45										1.25			0.10				1.10	
Mariboro Standardization	5.75		1.00				0.25		3.00		1.00							0.50	
Alt Humectants/Preserv	0.30			0.00							0.10							0.20	
Micro Quality Improv	7.10			7.00														0.10	
Monogram Inks	0.00																		
Packaging - Inks & Solvents	3.85		1.00					2.50			0.35								
Semiworks Support	17.10								2.00		0.10							15.00	
Burley Spray/Dry Flavors	0.80										0.50							0.30	
Flavor Specs/Certs	1.30		0.50								0.60								
ETS Studies	1.60		1.50											0.20					
Entomological Support	3.70		0.50	3.20										0.10					
Project Warhol	0.00			0.00															
Engineering Stud/Methods	3.20		2.50						0.50		0.20								
Recon Sheet Certification	0.00										0.00								
Cooperative Leaf Studies	2.00		1.50			0.50													
Environmental Issues	16.65		5.50	1.50		1.00	1.00		1.00		0.50		1.00	0.40		2.00	2.00	0.75	
PROJECT TOMORROW	19.50		2.00		0.20	0.35	3.00	1.50	0.50		1.00		8.00	0.20		2.00		0.75	
OPTICAL PROCESSING	6.30												6.00					0.30	
NEW EXPANSION PROCESS	20.00		3.00		0.20						0.60		5.00	1.00		6.20	3.00	1.00	
CAST LEAF RCB PROCESS	19.45		2.50						1.00		0.50			0.60			14.00	0.85	
PROJECT ART									0.00										
Art Sup of Current proc	6.95		0.00	0.00		0.00	0.50	0.00	0.00		0.25						0.50	5.70	
Art Process Development	14.75		2.50	0.50	0.20	1.05					0.50						10.00		
Art Total																			
PROJECT BETA	36.05		5.00	1.00	0.40	0.10					1.25		25.00			3.30			
PROJECT SIGMA	0.70							0.00			0.00							0.70	
TSNA	13.70		1.00	12.60		0.10													
LBA	9.80		0.50	9.00		0.10								0.20					
REDUCED SS/PAPER TECH	37.45		5.50	4.00	0.20	12.00	0.25	12.75			0.25			0.50				2.00	
PROJECT AMBROSIA/ASH TRAY ODOR	7.45		2.50	0.00		2.10	0.75	1.00			0.50			0.20				0.40	
PROJECT PACT	0.40													0.40			0.00		
LOW TAR/HIGH FLAVOR	10.10		1.50	0.50		0.95	1.00	1.00	0.00		3.25							1.90	
FILTER RESEARCH	0.00																	0.00	
Domestic	7.30		0.50		0.20	1.10		3.00	0.50		0.30		1.00					0.70	
International	1.50							1.50			0.00								
DOMESTIC PRODUCT DEVELOPMENT	67.35		1.00		0.30		5.50	2.00	14.00		5.05	25.30		0.90		1.50	1.00	10.80	
INTERNATIONAL PRODUCT SUPPORT	0.00																0.00	0.00	
PM USA	22.05		1.50		0.30	0.20		1.75	2.00		3.00	1.00					0.50	11.80	
PM PI	41.00						15.00		22.00		2.00	2.00							
PROJECT NATURAL	0.70										0.00							0.70	
INGREDIENTS	3.10			0.70															
MENTHOL	5.55					0.90	1.00	0.30	0.50		2.35						0.50		
REDUCED TAR & NICOTINE INTL	1.80							0.50	0.50		0.20							0.60	
SELECTIVE FILTRATION	4.75		1.00			1.00		0.75					2.00						
NEW PACKAGING CONCEPTS	0.20							0.20											
PROCESS DEV STUDIES	2.25							1.10								0.00		1.15	
COMBUSTION RESEARCH			0.00																
Mass Burn Control	1.10							0.10					1.00						
Pyrolysis Temp Control	2.00		1.00					1.00											
FLAVORS																			
Thermal Flavor Release	3.85		1.00			1.60		0.25			1.00								
Flavor Formation Studies	1.20					0.20					1.00								
Fragrances	0.25					0.20					0.05								
Volatile Flavors	0.85					0.40					0.45								
AEROSOLS																			
Formation Mechanisms	4.55				1.00	1.35		0.20					2.00						
Short Lived Aerosols	1.00												1.00						
SELECTIVE SEPARATIONS																			
Supercritical Technology	4.50		3.00	0.00													1.50		

2026230648

	TOTAL	ADMIN	ARD	BCR	CAD	CHM	CIGDEV	CIGTEC	CTSD	DEVENG	FLADEV	RED	PHY	STS-TA	TIS	TOBFUN	TOBMATL	TOBPF	EX/ADMIN
DIRECT 1993																			
Membrane Separation	0.45																		
CONSUMER TESTING RESEARCH						0.45													
Regression Based Mod of Lik	1.50											1.50							
Stochastic Discrimination Mo	0.50											0.50							
Cost/Benefit Eval	0.50											0.50							
Quant Mod of Market Dynamics	0.20											0.20							
CHEMICAL SENSES																			
Electrophysiological Stud	1.00				1.00							0.00							
Trigeminal Stud	1.00				1.00														
Odor Panel	0.40										0.40								
Room Odor Panel	0.00																		
Flav Response/ Chm Aspects	3.50		2.00		1.00									0.50					
Struct-Act Relationships	1.00				1.00														
MEAS & SENS OF PHY & CHM CHAR																			
Process Control Sys	1.00		1.00																
BIOLOGICAL																			
Bioconversion	2.05		1.00		1.00							0.05							
Antibodies	1.05				1.00							0.05							
Biosensors	3.00				3.00														
COMPUTING SYSTEMS																			
Expert Sys & Neural Net	2.00					2.00													
Optical Computing	0.00																		
BASIC ANALYTICAL RESEARCH	2.00		2.00																
Plant Tissue Culture	2.00				2.00														
Processing Plt Sup	0.50				0.00						0.50				0.00		0.00		
Biochemical Processing	1.00				1.00										0.00				
Alpha	0.00																		
Primary Improv	2.00																		
Recon Plt Sup	3.00																		
Total Support	151.70	29.00	1.00	0.00	28.00	2.70	0.00	0.00	11.00	26.00	0.00	0.00	0.00	0.00	11.00	0.00	0.00	0.00	43.00
Total Direct	446.30	0.00	63.00	52.00	5.00	27.30	14.00	31.00	26.00	0.00	27.00	29.00	52.00	8.00	0.00	15.00	38.00	59.00	0.00
Total Direct & Support	598.00	29.00	64.00	52.00	33.00	30.00	14.00	31.00	37.00	26.00	27.00	29.00	52.00	8.00	11.00	15.00	38.00	59.00	43.00
	598.00																		
	446.30																		

2026230649

DIRECT 1994	TOTAL	ADMIN	ARD	BGR	CAD	CHM	CIGDEV	CIGTEC	CTSD	DEVENG	FLADEV	PED	PHY	STS-TA	TIS	TOBFUN	TOBMATL	TOBPF	EX/ADMIN
OPERATIONS SUPPORT									0.00										
Adhesives	3.60		3.00								0.20								0.40
Cigarette Monitoring	1.20								0.50		0.10								0.10
Materials Evaluation	4.70		3.00			0.05	0.25	0.00						0.20					1.20
Customer Complaints-T/O/S	2.00		1.00					0.70						0.20					0.10
Flavor Dev/Analytical Sup	2.65										1.45			0.10					1.10
Marlboro Standardization	5.75		1.00				0.25		3.00		1.00								0.50
Alt Humectants/Preserv	0.30			0.00							0.10								0.20
Micro Quality Improv	7.10			7.00															0.10
Monogram Inks	0.00																		
Packaging - Inks & Solvents	3.85		1.00					2.50											
Semiworks Support	17.10								2.00		0.10								15.00
Burley Spray/Dry Flavors	0.80										0.50								0.30
Flavor Specs/Certs	1.30		0.50								0.60								
ETS Studies	1.60		1.50											0.10					
Entomological Support	3.70		0.50	3.20															
Project Warhol	0.00			0.00															
Engineering Stud/Methods	4.00		2.50						0.50		1.00								
Recon Sheet Certification	0.00										0.00								
Cooperative Leaf Studies	2.00		1.50				0.50												
Environmental Issues	20.45		6.00	2.20			2.00	1.00	1.00		0.50		2.00	0.50		2.50	2.00		0.75
PROJECT TOMORROW	21.80		3.00		0.20		0.35	3.50	1.50	0.50			8.00			3.50			0.75
OPTICAL PROCESSING	7.30												7.00						0.30
NEW EXPANSION PROCESS	13.70		2.50		0.20						0.60		3.00	1.20		4.20	1.00		1.00
CAST LEAF RCB PROCESS	16.45		2.50						1.00		0.10			0.80			11.20		0.85
PROJECT ART									0.00										
Art Sup of Current proc	6.30		0.00	0.00		0.00	0.50	0.00			0.10						0.00		5.70
Art Process Development	12.35		2.00	0.00	0.20	1.05					0.10						9.00		
Art Total																			
PROJECT BETA	37.05		6.00	1.00	0.40	0.10					1.25		25.00			3.30			
PROJECT SIGMA	0.70							0.00			0.00								0.70
TSNA	12.00		0.50	10.40		0.10							1.00						
LBA	12.80		0.50	12.00		0.10								0.20					
REDUCED SS/PAPER TECH	35.70		5.50	3.00	0.20	11.00	0.50	12.75			0.25			0.50					2.00
PROJECT AMBROSIA/ASH TRAY ODOR	4.50		1.00	0.00		1.10	0.50	1.00			0.50			0.00					0.40
PROJECT PACT	0.20													0.20			0.00		
LOW TAR/HIGH FLAVOR	9.85		1.50	0.50		0.95	1.00	1.00	0.00		3.00								1.90
FILTER RESEARCH	0.00																		0.00
Domestic	7.30		0.50		0.20	1.10		3.00	0.50		0.30		1.00						0.70
International	1.50							1.50			0.00								
DOMESTIC PRODUCT DEVELOPMENT	67.45		1.00		0.30		5.50	2.00	14.00		5.05	25.30		1.00		1.50	1.00	10.80	
INTERNATIONAL PRODUCT SUPPORT	0.00																0.00		0.00
PM USA	23.30		1.50		0.30	0.20		1.75	2.00		4.25	1.00					0.50	11.80	
PM PI	41.00						15.00		22.00		2.00	2.00							
PROJECT NATURAL	0.70										0.00								0.70
INGREDIENTS	3.10			0.70															
MENTHOL	5.20					0.90	0.50	0.30	0.50		2.50			2.40			0.50		
REDUCED TAR & NICOTINE INTL	1.60							0.75	0.50		0.00								0.60
SELECTIVE FILTRATION	4.75		1.00			1.00							2.00						
NEW PACKAGING CONCEPTS	0.20							0.20											
PROCESS DEV STUDIES	2.25							1.10								0.00			1.15
COMBUSTION RESEARCH			0.00																
Mass Burn Control	1.10					0.10							1.00						
Pyrolysis Temp Control	2.00		1.00			1.00													
FLAVORS																			
Thermal Flavor Release	3.95		1.00					0.25			1.10								
Flavor Formation Studies	1.30							0.20			1.10								
Fragrances	0.25							0.20			0.05								
Volatile Flavors	1.15							0.40			0.75								
AEROSOLS																			
Formation Mechanisms	3.55				1.00	1.35		0.20					1.00						
Short Lived Aerosols	2.00												2.00						
SELECTIVE SEPARATIONS																			
Supercritical Technology	8.00		3.00	0.00													5.00		

0590829202

DIRECT 1994	TOTAL	ADMIN	ARD	BCR	CAD	CHM	GIGDEV	GIGTEC	CTSD	DEVENG	FLADEV	PED	PHY	STS-TA	TIS	TOBFUN	TOBMATL	TOBPF	EX/ADMIN
Membrane Separation	1.45					0.45											1.00		
CONSUMER TESTING RESEARCH																			
Regression Based Mod of Lix	1.50											1.50							
Stochastic Discrimination Mo	0.50											0.50							
Cost/Benefit Eval	0.50											0.50							
Quant Mod of Market Dynamics	0.20											0.20							
CHEMICAL SENSES																			
Electrophysiological Stud	1.00			1.00		0.00													
Trigeminal Stud	1.00			1.00															
Odor Panel	0.40					0.40													
Room Odor Panel	0.00																		
Flav Response/ Chm Aspects	4.90		2.50	1.00		1.00								0.40					
Struct-Act Relationships	2.00			1.00		1.00													
MEAS & SENS OF PHY & CHM CHAR																			
Process Control Sys	1.00		1.00																
BIOLOGICAL																			
Bioconversion	2.05		1.00	1.00		0.05													
Antibodies	1.05			1.00		0.05													
Biosensors	3.50		0.50	3.00															
COMPUTING SYSTEMS																			
Expert Sys & Neural Net	2.00				2.00														
Optical Computing	0.00																		
BASIC ANALYTICAL RESEARCH	2.50		2.50																
Plant Tissue Culture	2.00																		
Processing Plant Sup	0.50			2.00															
Biochemical Processing	2.00			2.00							0.50				0.00		0.00		
Alpha	0.00														0.00				
Primary Improvement	2.30																		
Recon Plant Sup	4.50																2.30		
																	4.50		
Total Support	151.70	29.00	1.00	0.00	28.00	2.70	0.00	0.00	11.00	26.00	0.00	0.00	0.00	0.00	11.00	0.00	0.00	0.00	43.00
Total Direct	450.30	0.00	63.00	53.00	5.00	28.30	14.00	31.00	26.00	0.00	28.00	29.00	53.00	8.00	0.00	15.00	38.00	59.00	0.00
Total Direct & Support	602.00	29.00	64.00	53.00	33.00	31.00	14.00	31.00	37.00	26.00	28.00	29.00	53.00	8.00	11.00	15.00	38.00	59.00	43.00
	602.00																		
	450.30																		

1590329202

DIRECT 1995	TOTAL	ADMIN	ARD	BCR	CAD	CHM	CIGDEV	CIGTEC	CTSD	DEVENG	FLADEV	PED	PHY	STS-TA	TIS	TOBEUN	TOBMATL	TOBPF	EX/ADMIN
OPERATIONS SUPPORT									0.00										
Adhesives	3.60		3.00								0.20							0.40	
Cigarette Monitoring	1.20								0.50		0.10							0.10	
Materials Evaluation	4.70		3.00			0.05	0.25	0.00						0.20				1.20	
Customer Complaints-T/O/S	2.00		1.00					0.70			0.10			0.20					
Flavor Dev/Analytical Sup	2.65										1.45			0.10				1.10	
Marlboro Standardization	5.75		1.00				0.25		3.00		1.00							0.50	
Alt Humectants/Preserv	0.30			0.00							0.10							0.20	
Micro Quality Improv	7.10			7.00														0.10	
Monogram Inks	0.00																		
Packaging - Inks & Solvents	4.85		2.00					2.50			0.35								
Semiworks Support	17.10								2.00		0.10							15.00	
Burley Spray/Dry Flavors	0.80										0.50							0.30	
Flavor Specs/Certs	1.30		0.50								0.60			0.20					
ETS Studies	1.60		1.50											0.10					
Entomological Support	3.70		0.50	3.20															
Project Warhol	0.00			0.00															
Engineering Stud/Methods	4.00		2.50						0.50		1.00								
Recon Sheet Certification	0.00										0.00								
Cooperative Leaf Studies	2.00		1.50			0.50													
Environmental Issues	23.95		7.50	2.20		3.00	1.00		1.00		0.50		3.00	0.50		2.50	2.00	0.75	
PROJECT TOMORROW	15.80		1.00		0.20	0.35	2.00	1.50	0.50		0.00		6.00			3.50		0.75	
OPTICAL PROCESSING	7.30												7.00					0.30	
NEW EXPANSION PROCESS	12.20		2.00		0.20						0.60		3.00	1.20		4.20	0.00	1.00	
CAST LEAF RCB PROCESS	15.65		2.50						1.00		0.00			0.80			10.50	0.85	
PROJECT ART									0.00										
Art Sup of Current proc	6.30		0.00	0.00		0.00	0.50	0.00	0.00		0.10						0.00	5.70	
Art Process Development	6.35		1.00	0.00	0.20	1.05					0.10						4.00		
Art Total																			
PROJECT BETA	32.05		6.00	1.00	0.40	0.10					1.25		20.00			3.30			
PROJECT SIGMA	0.70							0.00			0.00							0.70	
TSNA	12.50			11.40		0.10							1.00						
IBA	12.80		0.50	12.00		0.10								0.20				1.00	
REDUCED SS/PAPER TECH	33.50		5.50	3.00	0.20	10.00	0.50	12.75			0.25			0.30				0.40	
PROJECT AMBROSIA/ASH TRAY ODOR	2.15		0.00	0.00		0.00	0.50	1.00			0.25								
PROJECT PACT	0.00																0.00		
LOW TAR/HIGH FLAVOR	9.85		1.50	0.50		0.95	1.00	1.00	0.00		3.00							1.90	
FILTER RESEARCH	0.00																	0.00	
Domestic	7.30		0.50		0.20	1.10		3.00	0.50		0.30		1.00					0.70	
International	1.50							1.50			0.00								
DOMESTIC PRODUCT DEVELOPMENT	70.95		1.00		0.30		8.00	2.00	14.00		5.05	26.30		1.00		1.50	1.00	10.80	
INTERNATIONAL PRODUCT SUPPORT																	0.00	0.00	
PM USA	25.05		1.50		0.30	0.20		1.75	2.00		5.00	1.00					0.50	12.80	
PM PI	41.00						15.00		22.00		2.00	2.00							
PROJECT NATURAL	0.70										0.00							0.70	
INGREDIENTS	3.10			0.70											2.40				
MENTHOL	5.70					0.90	0.50	0.30	0.50		3.00						0.50		
REDUCED TAR & NICOTINE INTL	1.60							0.50	0.50		0.00							0.60	
SELECTIVE FILTRATION	6.75		1.00			2.00		0.75					3.00						
NEW PACKAGING CONCEPTS	0.20							0.20											
PROCESS DEV STUDIES	2.25							1.10										1.15	
COMBUSTION RESEARCH			0.00																
Mass Burn Control	0.10					0.10													
Pyrolysis Temp Control	2.10		1.00			1.10													
FLAVORS																			
Thermal Flavor Release	4.20		1.00					0.25			1.35								
Flavor Formation Studies	1.55					0.20					1.35								
Fragrances	0.25					0.20					0.05								
Volatile Flavors	1.15					0.40					0.75								
AEROSOLS																			
Formation Mechanisms	3.55				1.00	1.35		0.20					1.00						
Short Lived Aerosols	3.00												3.00						
SELECTIVE SEPARATIONS																			
Supercritical Technology	12.00		4.00	0.00													8.00		

2590829202

	TOTAL	ADMIN	ARD	BCR	CAD	CHM	CIGDEV	CIGTEC	CTSD	DEVENG	FLADEV	PED	PHY	STS-TA	TIS	TOBFUN	TOBMATL	TOBPF	EX/ADMIN
DIRECT 1995																			
Membrane Separation	4.45					0.45											4.00		
CONSUMER TESTING RESEARCH																			
Regression Based Mod of Lik	1.50											1.50							
Stochastic Discrimination Mo	0.50											0.50							
Cost/Benefit Eval	0.50											0.50							
Quant Mod of Market Dynamics	0.20											0.20							
CHEMICAL SENSES																			
Electrophysiological Stud	1.00			1.00		0.00													
Trigeminal Stud	1.00			1.00															
Odor Panel	0.40					0.40													
Room Odor Panel	0.00																		
Flav Response/ Chm Aspects	5.80		3.00	1.00		1.00								0.80					
Struct-Act Relationships	2.00			1.00		1.00													
MEAS & SENS OF PHY & CHM CHAR																			
Process Control Sys	1.00		1.00																
BIOLOGICAL																			
Bioconversion	2.05		1.00	1.00		0.05													
Antibodies	1.05			1.00		0.05													
Biosensors	4.00		1.00	3.00															
COMPUTING SYSTEMS	0.00																		
Expert Sys & Neural Net	2.00				2.00														
Optical Computing	0.00																		
BASIC ANALYTICAL RESEARCH	3.00		3.00																
Plant Tissue Culture	2.00			2.00							0.60				0.00		0.00		
Processing Plant Sup	0.60			0.00											0.00				
Biochemical Processing	2.00			2.00									5.00						
Alpha	5.00																3.00		
Primary Improvement	3.00																4.50		
Recon Plant Sup	4.50																		
Total Support	151.70	29.00	1.00	0.00	28.00	2.70	0.00	0.00	11.00	26.00	0.00	0.00	0.00	0.00	11.00	0.00	0.00	0.00	43.00
Total Direct	454.30	0.00	63.00	54.00	5.00	28.30	15.00	31.00	26.00	0.00	29.00	30.00	53.00	8.00	0.00	15.00	38.00	59.00	0.00
Total Direct & Support	606.00	29.00	64.00	54.00	33.00	31.00	15.00	31.00	37.00	26.00	29.00	30.00	53.00	8.00	11.00	15.00	38.00	59.00	43.00
	606.00																		
	454.30																		

2026230653

2026230654

APPENDIX O

Resource Allocations

By Division

2026230655

	1991	1992	1993	1994	1995
ADMIN9195R.W20					
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues					
PROJECT TOMORROW					
OPTICAL PROCESSING					
NEW EXPANSION PROCESS					
CAST LEAF RCB PROCESS					
PROJECT ART					
Art Sup of Current proc					
Art Process Development					
Art Total					
PROJECT BETA					
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH					
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT					
LOW TAR/HIGH FLAVOR					
FILTER RESEARCH					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT					
INTERNATIONAL PRODUCT SUPPORT					
PM: USA					
PM: PI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	29.00	29.00	29.00	29.00	29.00
Total Direct	0.00	0.00	0.00	0.00	0.00
Total Direct & Support	29.00	29.00	29.00	29.00	29.00
Authorized total	29.00				

2026230656

	1991	1992	1993	1994	1995
ARD9195R.W20					
OPERATIONS SUPPORT					
Adhesives	2.00	4.00	4.00	3.00	3.00
Cigarette Monitoring					
Materials Evaluation	3.50	3.50	3.00	3.00	3.00
Customer Complaints-T/O/S	1.00	1.00	1.00	1.00	1.00
Flavor Dev/Analytical Sup					
Marlboro Standardization	1.00	1.00	1.00	1.00	1.00
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents	1.00	1.00	1.00	1.00	2.00
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs	1.50	0.50	0.50	0.50	0.50
ETS Studies	1.00	1.00	1.50	1.50	1.50
Entomological Support	1.00	1.00	0.50	0.50	0.50
Project Warhol					
Engineering Stud/Methods	2.50	2.50	2.50	2.50	2.50
Recon Sheet Certification					
Cooperative Leaf Studies	1.50	1.50	1.50	1.50	1.50
Environmental Issues	4.50	5.00	5.50	6.00	7.50
PROJECT TOMORROW	1.00	2.00	2.00	3.00	1.00
OPTICAL PROCESSING					
NEW EXPANSION PROCESS	3.00	3.00	3.00	2.50	2.00
CAST LEAF RCB PROCESS	2.00	2.00	2.50	2.50	2.50
PROJECT ART					
Art Sup of Current proc	3.00	0.00	0.00	0.00	0.00
Art Process Development	4.00	3.00	2.50	2.00	1.00
Art Total					
PROJECT BETA	2.00	3.00	5.00	6.00	6.00
PROJECT SIGMA					
TSNA		0.50	1.00	0.50	
LBA	0.50	0.50	0.50	0.50	0.50
REDUCED SS/PAPER TECH	6.50	6.00	5.50	5.50	5.50
PROJECT AMBROSIA/ASH TRAY ODOR	2.00	2.50	2.50	1.00	0.00
PROJECT PACT					
LOW TAR/HIGH FLAVOR	1.00	1.00	1.50	1.50	1.50
FILTER RESEARCH					
Domestic	0.50	0.50	0.50	0.50	0.50
International					
DOMESTIC PRODUCT DEVELOPMENT	1.00	1.00	1.00	1.00	1.00
INTERNATIONAL PRODUCT SUPPORT					
PM USA	1.50	1.50	1.50	1.50	1.50
PM PI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION	1.50	1.50	1.00	1.00	1.00
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH		0.00	0.00	0.00	0.00
Mass Burn Control					
Pyrolysis Temp Control		1.00	1.00	1.00	1.00
FLAVORS					
Thermal Flavor Release	0.50	1.00	1.00	1.00	1.00
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology	2.00	3.00	3.00	3.00	4.00
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects	0.50	1.00	2.00	2.50	3.00
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys	1.00	1.00	1.00	1.00	1.00
BIOLOGICAL					
Bioconversion	1.00	1.00	1.00	1.00	1.00
Antibodies					
Biosensors				0.50	1.00
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH	2.00	2.00	2.00	2.50	3.00
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	1.00	1.00	1.00	1.00	1.00
Total Direct	57.00	60.00	63.00	63.00	63.00
Total Direct & Support	58.00	61.00	64.00	64.00	64.00
Authorized total	58.00				

2026230657

BCR9195R.W20	1991	1992	1993	1994	1995
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv	10.25	0.00	0.00	0.00	0.00
Micro Quality Improv/Tob Micro	4.10	6.00	7.00	7.00	7.00
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
BTS Studies					
Entomological Support	4.30	3.20	3.20	3.20	3.20
Project Warhol	0.00	0.00	0.00	0.00	0.00
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues	1.00	1.50	1.50	2.20	2.20
PROJECT TOMORROW					
OPTICAL PROCESSING					
NEW EXPANSION PROCESS					
CAST LEAF RCB PROCESS					
PROJECT ART					
Art Sup of Current proc	0.25	0.00	0.00	0.00	0.00
Art Process Development	0.4	0.50	0.50	0.00	0.00
Art Total					
PROJECT BETA			1.00	1.00	1.00
PROJECT SIGMA					
TSNA	18.40	17.85	12.60	10.40	11.40
LBA	10.40	9.00	9.00	12.00	12.00
REDUCED: SS/PAPER TECH	1.10	1.50	4.00	3.00	3.00
PROJECT AMBROSIA/ASH: TRAY ODOR	0.10	0.10	0.00	0.00	0.00
PROJECT PACT					
LOW TAR/HIGH FLAVOR	1.50	1.00	0.50	0.50	0.50
FILTER RESEARCH					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT					
INTERNATIONAL PRODUCT SUPPORT					
PM USA					
PM FI					
PROJECT NATURAL					
INGREDIENTS	0.20	0.50	0.70	0.70	0.70
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology	0.40	0.10	0.00	0.00	0.00
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud	0.60	1.00	1.00	1.00	1.00
Trigeminal Stud	0.25	0.75	1.00	1.00	1.00
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects		0.50	1.00	1.00	1.00
Struct-Act Relationships	0.20	0.50	1.00	1.00	1.00
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion	2.20	2.00	1.00	1.00	1.00
Antibodies	0.70	1.00	1.00	1.00	1.00
Biosensors	1.30	2.00	3.00	3.00	3.00
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
Plant Tissue Culture	1.35	2.00	2.00	2.00	2.00
New Project 1	0.00	0.00	0.00	0.00	0.00
Biochemical Processing			1.00	2.00	2.00
New Project 3					
New Project 4					
New Project 5					
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	50.00	51.00	52.00	53.00	54.00
Total Direct & Support	50.00	51.00	52.00	53.00	54.00
Allocated Total	50.00				

2026230658

CAD9195R.W20	1991	1992	1993	1994	1995
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues					
PROJECT TOMORROW	0.20	0.20	0.20	0.20	0.20
OPTICAL PROCESSING					
NEW EXPANSION PROCESS	0.20	0.20	0.20	0.20	0.20
CAST LEAF RCB PROCESS					
PROJECT ART					
Art Sup of Current proc					
Art Process Development	0.20	0.20	0.20	0.20	0.20
Art Total					
PROJECT BETA	0.40	0.40	0.40	0.40	0.40
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH	0.20	0.20	0.20	0.20	0.20
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT					
LOW TAR/HIGH FLAVOR					
FILTER RESEARCH					
Domestic	0.20	0.20	0.20	0.20	0.20
International					
DOMESTIC PRODUCT DEVELOPMENT	0.30	0.30	0.30	0.30	0.30
INTERNATIONAL PRODUCT SUPPORT					
PM USA	0.30	0.30	0.30	0.30	0.30
PM PI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms	1.00	1.00	1.00	1.00	1.00
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net	2.00	2.00	2.00	2.00	2.00
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	28.00	28.00	28.00	28.00	28.00
Total Direct	5.00	5.00	5.00	5.00	5.00
Total Direct & Support	33.00	33.00	33.00	33.00	33.00
Allocated Total	33.00				

2026230659

CHM9195R.W20	1991	1992	1993	1994	1995
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation	0.05	0.05	0.05	0.05	0.05
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies	0.50	0.50	0.50	0.50	0.50
Environmental Issues		1.00	1.00	2.00	3.00
PROJECT TOMORROW	0.35	0.35	0.35	0.35	0.35
OPTICAL PROCESSING					
NEW EXPANSION PROCESS					
CAST LEAF RCB PROCESS					
PROJECT ART					
Art Sup of Current proc	1.05	0.00	0.00	0.00	0.00
Art Process Development	1.05	1.05	1.05	1.05	1.05
Art Total					
PROJECT BETA	0.10	0.10	0.10	0.10	0.10
PROJECT SIGMA					
TSNA	0.10	0.10	0.10	0.10	0.10
LBA	0.10	0.10	0.10	0.10	0.10
REDUCED SS/PAPER TECH	13.00	12.00	12.00	11.00	10.00
PROJECT AMBROSIA/ASH TRAY ODOR	2.10	2.10	2.10	1.10	0.00
PROJECT PACT					
LOW TAR/HIGH FLAVOR	0.95	0.95	0.95	0.95	0.95
FILTER RESEARCH					
Domestic	0.05	1.10	1.10	1.10	1.10
International					
DOMESTIC PRODUCT DEVELOPMENT					
INTERNATIONAL PRODUCT SUPPORT					
PM USA	0.20	0.20	0.20	0.20	0.20
PM PI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL	0.90	0.90	0.90	0.90	0.90
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION		1.00	1.00	1.00	2.00
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control	0.10	0.10	0.10	0.10	0.10
Pyrolysis Temp Control		1.00	1.00	1.00	1.10
FLAVORS					
Thermal Flavor Release	1.60	1.60	1.60	1.60	1.60
Flavor Formation Studies	0.20	0.20	0.20	0.20	0.20
Fragrances	0.20	0.20	0.20	0.20	0.20
Volatile Flavors	0.40	0.40	0.40	0.40	0.40
AEROSOLS					
Formation Mechanisms	1.35	1.35	1.35	1.35	1.35
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation	0.45	0.45	0.45	0.45	0.45
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud	0.00	0.00	0.00	0.00	0.00
Trigeminal Stud					
Odor Panel	0.40	0.40	0.40	0.40	0.40
Room Odor Panel					
Flav Response/ Chm Aspects				1.00	1.00
Struct-Act Relationships				1.00	1.00
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion	0.05	0.05	0.05	0.05	0.05
Antibodies	0.05	0.05	0.05	0.05	0.05
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	2.70	2.70	2.70	2.70	2.70
Total Direct	25.30	27.30	27.30	28.30	28.30
Total Direct & Support	28.00	30.00	30.00	31.00	31.00
Allocated Total	28.00				

2026230660

	1991	1992	1993	1994	1995
CIGDEV9195R.W20					
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring	0.50	0.50	0.50	0.50	0.50
Materials Evaluation	0.25	0.25	0.25	0.25	0.25
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization	0.25	0.25	0.25	0.25	0.25
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues			1.00	1.00	1.00
PROJECT TOMORROW	2.00	2.50	3.00	3.50	2.00
OPTICAL PROCESSING					
NEW EXPANSION PROCESS					
CAST LEAF RCB PROCESS					
PROJECT ART					
Art Sup of Current proc	1.00	0.50	0.50	0.50	0.50
Art Process Development					
Art Total					
PROJECT BETA					
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH	0.25	0.25	0.25	0.50	0.50
PROJECT AMBROSIA/ASH TRAY ODOR	1.75	1.75	0.75	0.50	0.50
PROJECT PACT					
LOW TAR/HIGH FLAVOR	2.00	2.00	1.00	1.00	1.00
FILTER RESEARCH					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT	4.00	3.75	5.50	5.50	8.00
INTERNATIONAL PRODUCT SUPPORT					
PM USA					
PM PI	15.00	15.00	15.00	15.00	15.00
PROJECT NATURAL	0.50	0.50	-	-	-
INGREDIENTS					
MENTHOL	0.50	0.75	1.00	0.50	0.50
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	13.00	13.00	14.00	14.00	15.00
Total Direct & Support	13.00	13.00	14.00	14.00	15.00
Allocated Total	13.00				

2026230661

	1991	1992	1993	1994	1995
CIGTEC9195.W20					
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation	0.00	0.00	0.00	0.00	0.00
Customer Complaints-T/O/S	0.70	0.70	0.70	0.70	0.70
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents	2.75	2.75	2.50	2.50	2.50
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues					
PROJECT TOMORROW	1.25	1.50	1.50	1.50	1.50
OPTICAL PROCESSING					
NEW EXPANSION PROCESS					
CAST LEAF RGB PROCESS					
PROJECT ART					
Art Sup of Current proc	0.25	0.25	0.00	0.00	0.00
Art Process Development					
Art Total					
PROJECT BETA					
PROJECT SIGMA	0.10	0.00	0.00	0.00	0.00
TSNA					
LBA					
REDUCED SS/PAPER TECH	11.25	12.25	12.75	12.75	12.75
PROJECT AMBROSIA/ASH TRAY ODOR	1.00	1.00	1.00	1.00	1.00
PROJECT PACT					
LOW TAR/HIGH FLAVOR	1.00	1.00	1.00	1.00	1.00
FILTER RESEARCH					
Domestic	3.00	3.00	3.00	3.00	3.00
International	1.50	1.50	1.50	1.50	1.50
DOMESTIC PRODUCT DEVELOPMENT	1.75	2.00	2.00	2.00	2.00
INTERNATIONAL PRODUCT SUPPORT					
PM: USA	1.50	1.75	1.75	1.75	1.75
PM: PI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL	0.30	0.30	0.30	0.30	0.30
REDUCED TAR & NICOTINE INTL	0.50	0.50	0.50	0.50	0.50
SELECTIVE FILTRATION	0.40	0.75	0.75	0.75	0.75
NEW PACKAGING CONCEPTS	0.20	0.20	0.20	0.20	0.20
PROCESS DEV STUDIES (FILTER)	1.10	1.10	1.10	1.10	1.10
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release	0.25	0.25	0.25	0.25	0.25
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms	0.20	0.20	0.20	0.20	0.20
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
PROCESS PLANT SUPPORT					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	29.00	31.00	31.00	31.00	31.00
Total Direct & Support	29.00	31.00	31.00	31.00	31.00
Allocated Total	29.00	31.00	31.00	31.00	31.00

2026230662

GTSD9195R.W20:	1991	1992	1993	1994	1995
OPERATIONS SUPPORT	0.00	0.00	0.00	0.00	0.00
Adhesives					
Cigarette Monitoring	0.50	0.50	0.50	0.50	0.50
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup.					
Marlboro Standardization	3.00	3.00	3.00	3.00	3.00
Alt Humectants/Preserv.					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support	2.00	2.00	2.00	2.00	2.00
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods	0.50	0.50	0.50	0.50	0.50
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues		1.00	1.00	1.00	1.00
PROJECT TOMORROW	0.50	0.50	0.50	0.50	0.50
OPTICAL PROCESSING					
NEW EXPANSION PROCESS					
CAST LEAF RGB PROCESS	0.50	1.00	1.00	1.00	1.00
PROJECT ART	0.00	0.00	0.00	0.00	0.00
Art Sup of Current proc	1.00	0.00	0.00	0.00	0.00
Art Process Development					
Art Total					
PROJECT BETA					
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH					
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT					
LOW TAR/HIGH FLAVOR	0.50	0.00	0.00	0.00	0.00
FILTER RESEARCH					
Domestic	0.50	0.50	0.50	0.50	0.50
International					
DOMESTIC PRODUCT DEVELOPMENT	14.00	14.00	14.00	14.00	14.00
INTERNATIONAL PRODUCT SUPPORT					
PM USA	2.00	2.00	2.00	2.00	2.00
PM PI	22.00	22.00	22.00	22.00	22.00
PROJECT NATURAL					
INGREDIENTS					
MENTHOL	0.50	0.50	0.50	0.50	0.50
REDUCED TAR & NICOTINE INTL	0.50	0.50	0.50	0.50	0.50
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	11.00	11.00	11.00	11.00	11.00
Total Direct	26.00	26.00	26.00	26.00	26.00
Total Direct & Support	37.00	37.00	37.00	37.00	37.00
Allocated Total	37.00				

2026230663

	1991	1992	1993	1994	1995
DEVENG9195R.W20					
OPERATIONS SUPPORT					
Adhesives:					
Cigarette Monitoring:					
Materials Evaluation:					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues					
PROJECT TOMORROW	0.20	0.20			
OPTICAL PROCESSING	0.20	0.20			
NEW EXPANSION PROCESS	3.5	3.50			
CAST LEAF RCB PROCESS	0.80	0.80			
PROJECT ART					
Art Sup of Current proc	0.40	0.40			
Art Process Development	1.1	1.10			
Art Total					
PROJECT BETA	1.7	0.70			
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH					
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT	0.40	0.00			
LOW TAR/HIGH FLAVOR					
FILTER RESEARCH					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT					
INTERNATIONAL PRODUCT SUPPORT					
PM USA					
PM FI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL	1.20	1.20			
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	16.50	17.90	26.00	26.00	26.00
Total Direct	9.50	8.10	0.00	0.00	0.00
Total Direct & Support	26.00	26.00	26.00	26.00	26.00
Allocated Total	26.00				

2026230664

	1991	1992	1993	1994	1995
EXEC/ADMIN					
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues					
PROJECT TOMORROW					
OPTICAL PROCESSING					
NEW EXPANSION PROCESS					
CAST LEAF RCB PROCESS					
PROJECT ART					
Art Sup of Current proc					
Art Process Development					
Art Total					
PROJECT BETA					
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH					
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT					
LOW TAR/HIGH FLAVOR					
FILTER RESEARCH					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT					
INTERNATIONAL PRODUCT SUPPORT					
PM USA					
PM PI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	43.00	43.00	43.00	43.00	43.00
Total Direct	0.00	0.00	0.00	0.00	0.00
Total Direct & Support	43.00	43.00	43.00	43.00	43.00
Allocated Total	43.00				

2026230665

FLADEV9195R.W20:	1991	1992	1993	1994	1995
OPERATIONS SUPPORT					
Adhesives	0.20	0.20	0.20	0.20	0.20
Cigarette Monitoring	0.10	0.10	0.10	0.10	0.10
Materials Evaluation					
Customer Complaints-T/O/S	0.10	0.10	0.10	0.10	0.10
Flavor Dev/Analytical Sup	0.20	0.70	1.25	1.45	1.45
Marlboro Standardization	1.00	1.00	1.00	1.00	1.00
Alt Humectants/Preserv	0.10	0.10	0.10	0.10	0.10
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents	0.20	0.20	0.35	0.35	0.35
Semiworks Support	0.10	0.10	0.10	0.10	0.10
Burley Spray/Dry Flavors	0.10	0.10	0.50	0.50	0.50
Flavor Specs/Certs	0.60	0.60	0.60	0.60	0.60
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods	0.00	0.00	0.20	1.00	1.00
Recon Sheet Certification	0.00	0.00	0.00	0.00	0.00
Cooperative Leaf Studies					
Environmental Issues	0.30	0.30	0.50	0.50	0.50
PROJECT TOMORROW	1.25	1.50	1.00	0.50	0.00
OPTICAL PROCESSING					
NEW EXPANSION PROCESS	0.85	0.60	0.60	0.60	0.60
CAST LEAF RCB PROCESS	0.70	0.50	0.50	0.10	0.00
PROJECT ART					
Art Sup of Current proc	0.25	0.25	0.25	0.10	0.10
Art Process Development	1.00	1.00	0.50	0.10	0.10
Art Total					
PROJECT BETA	0.25	1.00	1.25	1.25	1.25
PROJECT SIGMA	0.00	0.00	0.00	0.00	0.00
TSNA					
LBA					
REDUCED SS/PAPER TECH	0.60	0.25	0.25	0.25	0.25
PROJECT AMBROSIA/ASH TRAY ODOR	1.00	0.80	0.50	0.50	0.25
PROJECT PACT					
LOW TAR/HIGH FLAVOR	2.35	2.35	3.25	3.00	3.00
FILTER RESEARCH	0.00				
Domestic	0.30	0.30	0.30	0.30	0.30
International	0.00	0.00	0.00	0.00	0.00
DOMESTIC PRODUCT DEVELOPMENT	4.15	4.55	5.05	5.05	5.05
INTERNATIONAL PRODUCT SUPPORT					
PM USA	2.00	3.00	3.00	4.25	5.00
PM PI	2.00	2.00	2.00	2.00	2.00
PROJECT NATURAL	0.20	0.20	0.00	0.00	0.00
INGREDIENTS					
MENTHOL	2.00	2.00	2.35	2.50	3.00
REDUCED TAR & NICOTINE INTL	0.20	0.20	0.20	0.00	0.00
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release	1.00	1.00	1.00	1.10	1.35
Flavor Formation Studies	1.00	1.00	1.00	1.10	1.35
Fragrances	0.05	0.05	0.05	0.05	0.05
Volatile Flavors	0.45	0.45	0.45	0.75	0.75
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lix					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
PROCESS PLANT SUPPORT	0.40	0.50	0.50	0.50	0.60
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	23.00	25.00	27.00	28.00	29.00
Total Direct & Support	23.00	25.00	27.00	28.00	29.00
Allocated Total	23.00				

2026230666

	1991	1992	1993	1994	1995
PED9195.W20					
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues					
PROJECT TOMORROW					
OPTICAL PROCESSING					
NEW EXPANSION PROCESS					
CAST LEAF RCB PROCESS					
PROJECT ART					
Art Sup of Current proc					
Art Process Development					
Art Total					
PROJECT BETA					
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH					
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT					
LOW TAR/HIGH FLAVOR					
FILTER RESEARCH					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT	24.30	24.30	25.30	25.30	26.30
INTERNATIONAL PRODUCT SUPPORT					
PM USA	1	1.00	1.00	1.00	1.00
PM PI	2.00	2.00	2.00	2.00	2.00
PROJECT NATURAL					
INGREDIENTS					
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik	1.50	1.50	1.50	1.50	1.50
Stochastic Discrimination Mod	0.50	0.50	0.50	0.50	0.50
Cost/Benefit Eval	0.50	0.50	0.50	0.50	0.50
Quant Mod of Market Dynamics	0.20	0.20	0.20	0.20	0.20
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	28.00	28.00	29.00	29.00	30.00
Total Direct & Support	28.00	28.00	29.00	29.00	30.00
Allocated Total	28.00				

2026230667

	1991	1992	1993	1994	1995
PHY9195R.W20					
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks	1.00				
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues		1.00	1.00	2.00	3.00
PROJECT TOMORROW	6.50	7.00	8.00	8.00	6.00
OPTICAL PROCESSING	6.00	6.00	6.00	7.00	7.00
NEW EXPANSION PROCESS	8.00	6.00	5.00	3.00	3.00
CAST LEAF RCB PROCESS					
PROJECT ART					
Art Sup of Current proc	0.50				
Art Process Development	0.50				
Art Total					
PROJECT BETA	21.00	25.00	25.00	25.00	20.00
PROJECT SIGMA					
TSNA				1.00	1.00
LBA					
REDUCED SS/PAPER TECH					
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT	0.50				
LOW TAR/HIGH FLAVOR					
FILTER RESEARCH					
Domestic	0.50	1.00	1.00	1.00	1.00
International					
DOMESTIC PRODUCT DEVELOPMENT					
INTERNATIONAL PRODUCT SUPPORT					
PM:USA					
PM:PI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION	0.50	1.00	2.00	2.00	3.00
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control	1.00	1.00	1.00	1.00	
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms	2.00	2.00	2.00	1.00	1.00
Short Lived Aerosols	1.00	1.00	1.00	2.00	3.00
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
Alpha					5.00
New Project 4					
New Project 5					
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	49.00	51.00	52.00	53.00	53.00
Total Direct & Support	49.00	51.00	52.00	53.00	53.00
Allocated Total	49.00				

2026230668

	1991	1992	1993	1994	1995
STS-TA9195R.W20					
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation	0.20	0.20	0.20	0.20	0.20
Customer Complaints-T/O/S	0.10	0.10	0.10	0.20	0.20
Flavor Dev/Analytical Sup	0.10	0.10	0.10	0.10	0.10
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs	0.20	0.20	0.20	0.20	0.20
ETS Studies	0.10	0.10	0.10	0.10	0.10
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues	0.10	0.30	0.40	0.50	0.50
PROJECT TOMORROW	0.20	0.20	0.20		
OPTICAL PROCESSING					
NEW EXPANSION PROCESS	0.70	0.80	1.00	1.20	1.20
CAST LEAF RCB PROCESS	0.40	0.50	0.60	0.80	0.80
PROJECT ART					
Art Sup of Current proc					
Art Process Development					
Art Total					
PROJECT BETA					
PROJECT SIGMA					
TSNA					
LBA	0.20	0.20	0.20	0.20	0.20
REDUCED SS/PAPER TECH	1.00	1.00	0.50	0.50	0.30
PROJECT AMBROSIA/ASH TRAY ODOR	0.10	0.10	0.20	0.00	
PROJECT PACT	0.80	0.60	0.40	0.20	
LOW TAR/HIGH FLAVOR					
FILTER RESEARCH:					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT	0.90	0.90	0.90	1.00	1.00
INTERNATIONAL PRODUCT SUPPORT					
PM USA					
PM PI					
PROJECT NATURAL					
INGREDIENTS	2.60	2.40	2.40	2.40	2.40
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects	0.30	0.30	0.50	0.40	0.80
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	8.00	8.00	8.00	8.00	8.00
Total Direct & Support	8.00	8.00	8.00	8.00	8.00
Allocated Total	8.00				

2026230669

TIS9195R.W20	1991	1992	1993	1994	1995
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues					
PROJECT TOMORROW					
OPTICAL PROCESSING					
NEW EXPANSION PROCESS					
CAST LEAF RGB PROCESS					
PROJECT ART					
Art Sup of Current proc					
Art Process Development					
Art Total					
PROJECT BETA					
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH					
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT					
LOW TAR/HIGH FLAVOR					
FILTER RESEARCH					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT					
INTERNATIONAL PRODUCT SUPPORT					
PM USA					
PM PI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1	0.00	0.00	0.00	0.00	0.00
New Project 2	0.00	0.00	0.00	0.00	0.00
New Project 3					
New Project 4					
New Project 5					
Total Support	11.00	11.00	11.00	11.00	11.00
Total Direct	0.00	0.00	0.00	0.00	0.00
Total Direct & Support	11.00	11.00	11.00	11.00	11.00
Allocated Total	11.00				

2026230670

	1991	1992	1993	1994	1995
TOBFUN9195R.W20					
OPERATIONS SUPPORT					
Adhesives:					
Cigarette Monitoring					
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues		1.50	2.00	2.50	2.50
PROJECT TOMORROW		1.00	2.00	3.50	3.50
OPTICAL PROCESSING					
NEW EXPANSION PROCESS	11.70	8.20	6.20	4.20	4.20
CAST LEAF RCB PROCESS					
PROJECT ART					
Art Sup of Current proc					
Art Process Development					
Art Total					
PROJECT BETA	3.3	3.30	3.30	3.30	3.30
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH					
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT					
LOW TAR/HIGH FLAVOR					
FILTER RESEARCH					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT		1.00	1.50	1.50	1.50
INTERNATIONAL PRODUCT SUPPORT					
PM USA					
PM FI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL					
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES	0.00	0.00	0.00	0.00	0.00
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lix					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	15.00	15.00	15.00	15.00	15.00
Total Direct & Support	15.00	15.00	15.00	15.00	15.00
Allocated Total	15.00				

2026230671

	1991	1992	1993	1994	1995
TOBMATL91915.W20					
OPERATIONS SUPPORT					
Adhesives					
Cigarette Monitoring					
Materials Evaluation					
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup					
Marlboro Standardization					
Alt Humectants/Preserv					
Micro Quality Improv					
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support					
Burley Spray/Dry Flavors					
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues		1.00	2.00	2.00	2.00
PROJECT TOMORROW					
OPTICAL PROCESSING					
NEW EXPANSION PROCESS	7.00	4.00	3.00	1.00	0.00
CAST SHEET RCB PROCESS	8.40	15.60	14.00	11.20	10.50
PROJECT ART					
Art Sup of Current proc	3.20	0.50	0.50	0.00	0.00
Art Process Development	9.00	10.00	10.00	9.00	4.00
Art Total					
PROJECT BETA					
PROJECT SIGMA					
TSNA					
LBA					
REDUCED SS/PAPER TECH					
PROJECT AMBROSIA/ASH TRAY ODOR					
PROJECT PACT	1.00	0.00	0.00	0.00	0.00
LOW TAR/HIGH FLAVOR	0.50				
FILTER RESEARCH					
Domestic					
International					
DOMESTIC PRODUCT DEVELOPMENT	1.00	1.00	1.00	1.00	1.00
INTERNATIONAL PRODUCT SUPPORT	0.00	0.00	0.00	0.00	0.00
PM USA	0.50	0.50	0.50	0.50	0.50
PM PI					
PROJECT NATURAL					
INGREDIENTS					
MENTHOL	0.50	0.50	0.50	0.50	0.50
REDUCED TAR & NICOTINE INTL					
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES					
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology			1.50	5.00	8.00
Membrane Separation				1.00	4.00
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lik					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1	0.00	0.00	0.00	0.00	0.00
New Project 2					
New Project 3					
Primary Improvement Program	4.00	3.00	2.00	2.30	3.00
Reconstitution Plant Support	2.90	1.90	3.00	4.50	4.50
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	38.00	38.00	38.00	38.00	38.00
Total Direct & Support	38.00	38.00	38.00	38.00	38.00
Allocated Total	38.00				

2026230672

	1991	1992	1993	1994	1995
TOBPF919SR.W201					
OPERATIONS SUPPORT					
Adhesives	0.40	0.40	0.40	0.40	0.40
Cigarette Monitoring	0.10	0.10	0.10	0.10	0.10
Materials Evaluation	1.20	1.20	1.20	1.20	1.20
Customer Complaints-T/O/S					
Flavor Dev/Analytical Sup	1.10	1.10	1.10	1.10	1.10
Marlboro Standardization	0.50	0.50	0.50	0.50	0.50
Alt Humectants/Preserv	0.20	0.20	0.20	0.20	0.20
Micro Quality Improv	0.10	0.10	0.10	0.10	0.10
Monogram Inks					
Packaging - Inks & Solvents					
Semiworks Support	15.00	15.00	15.00	15.00	15.00
Burley Spray/Dry Flavors	0.30	0.30	0.30	0.30	0.30
Flavor Specs/Certs					
ETS Studies					
Entomological Support					
Project Warhol					
Engineering Stud/Methods					
Recon Sheet Certification					
Cooperative Leaf Studies					
Environmental Issues	0.10	0.25	0.75	0.75	0.75
PROJECT TOMORROW	2.00	1.00	0.75	0.75	0.75
OPTICAL PROCESSING	0.15	0.30	0.30	0.30	0.30
NEW EXPANSION PROCESS	2.00	2.00	1.00	1.00	1.00
CAST LEAF RCB PROCESS	1.00	0.85	0.85	0.85	0.85
PROJECT ART					
Art Sup of Current proc	8.70	7.50	5.70	5.70	5.70
Art Process Development					
Art Total					
PROJECT BETA					
PROJECT SIGMA	0.90	0.80	0.70	0.70	0.70
TSNA					
LBA					
REDUCED SS/PAPER TECH	2.95	2.90	2.00	2.00	1.00
PROJECT AMBROSIA/ASH TRAY ODOR	0.20	0.30	0.40	0.40	0.40
PROJECT PACT					
LOW TAR/HIGH FLAVOR	0.80	0.90	1.90	1.90	1.90
FILTER RESEARCH	0.00	0.00	0.00	0.00	0.00
Domestic	0.50	0.70	0.70	0.70	0.70
International					
DOMESTIC PRODUCT DEVELOPMENT	9.80	10.80	10.80	10.80	10.80
INTERNATIONAL PRODUCT SUPPORT	0.00	0.00	0.00	0.00	0.00
PM USA	8.80	9.80	11.80	11.80	12.80
PM PI					
PROJECT NATURAL	0.80	0.60	0.70	0.70	0.70
INGREDIENTS					
MENTHOL					
REDUCED TAR & NICOTINE INTL	0.50	0.50	0.60	0.60	0.60
SELECTIVE FILTRATION					
NEW PACKAGING CONCEPTS					
PROCESS DEV STUDIES	0.90	0.90	1.15	1.15	1.15
COMBUSTION RESEARCH					
Mass Burn Control					
Pyrolysis Temp Control					
FLAVORS					
Thermal Flavor Release					
Flavor Formation Studies					
Fragrances					
Volatile Flavors					
AEROSOLS					
Formation Mechanisms					
Short Lived Aerosols					
SELECTIVE SEPARATIONS					
Supercritical Technology					
Membrane Separation					
CONSUMER TESTING RESEARCH					
Regression Based Mod of Lix					
Stochastic Discrimination Mod					
Cost/Benefit Eval					
Quant Mod of Market Dynamics					
CHEMICAL SENSES					
Electrophysiological Stud					
Trigeminal Stud					
Odor Panel					
Room Odor Panel					
Flav Response/ Chm Aspects					
Struct-Act Relationships					
MEAS & SENS OF PHY & CHM CHAR					
Process Control Sys					
BIOLOGICAL					
Bioconversion					
Antibodies					
Biosensors					
COMPUTING SYSTEMS					
Expert Sys & Neural Net					
Optical Computing					
BASIC ANALYTICAL RESEARCH					
New Project 1					
New Project 2					
New Project 3					
New Project 4					
New Project 5					
Total Support	0.00	0.00	0.00	0.00	0.00
Total Direct	59.00	59.00	59.00	59.00	59.00
Total Direct & Support	59.00	59.00	59.00	59.00	59.00
Allocated Total	59.00				

2026230673

2026230674

APPENDIX P

Action Plans/Recommendations

2026230675

Action Plans/Recommendations on various internal issues and future factors have been developed for review and discussion:

1. Strategic Technology Selection, Development, and Review.
 - Involves an extension of our current process and focuses on technologies which may go beyond the direct control of the program coordinator, long-term are longer term and involve total utilization of technical staff in technology evaluation, implementation and review.
2. Support of Science Education
 - Addresses the need to foster the development of quality science education programs to ensure an adequate pool of skilled workers that will meet future company needs.
3. Recruiting
 - Discusses our current position with regard to recruiting and suggests additional strategies which may change the process to one that is more opportunistic rather than reactive.
4. Training
 - Outlines a number of key areas which will increase the awareness of the R&D staff (cross-functional training) and enhance the consistency of the work product (data analysis) and effectiveness of the management of the work processes (project planning).
5. Facility Plan
 - Head count projections, organizational changes, as well as the implementation of new technologies and workplace regulations will necessitate changes to R&D facilities. A facility plan is under development and progress is summarized.

STRATEGIC TECHNOLOGY SELECTION, DEVELOPMENT, AND REVIEW

The Strategic Technology List (Appendix E) is intended as an aid to the selection and development of technologies in support of our major programs. Since R&D resources cannot support all of these items, decisions between them must be made. Feasibility, timeliness and

2026230676

resource availability must be considered. By and large, this function is handled efficiently by the managers and program coordinators. Three areas where the process might be improved are:

1. The development of strategic science and technology items which require resources beyond the direct control of the program coordinator. These may require facilities or expertise from other programs, divisions or directorates or from external sources. Negotiation for work on such items is often delayed in cases where their development is necessary to the long-term objectives of the program, but not to the immediate goals.
2. The identification and utilization of existing R&D expertise for the evaluation of new science or technology areas.
3. The planning, initiation and review of basic research in support of long-term needs. In the face of specific immediate needs, it is difficult for a program coordinator or manager to justify the diversion of resources to basic investigations--no matter how promising these may seem in the long run. Thorough studies of the feasibility of timely contributions to program objectives are, themselves, resource consuming. Moreover, cost effective basic research may need to be structured to support several programs.

Action Plan: Strategic Science and Technology Identification, Development and Utilization.

To deal more efficiently with areas one and two, we recommend the establishment of an "R&D Technology Taskforce" This group would be chartered to:

- Obtain careful evaluations of the potential of selected areas of science or technology to contribute to R&D objectives.
- Promote the establishment of internal technology monitoring activities in the selected areas.
- Recommend appropriate development activities, which might range from evaluating commercial products to sponsoring external research or establishing an internal program.
- Provide continuing support for all activities initiated up to and including the implementation of developed technologies.

Areas to be evaluated would be selected in collaboration with the Managers and Program Coordinators. Unless requested by the Coordinators or Managers to do otherwise, the Task

Force would confine its efforts to forward-looking technology evaluations and would not review the objectives or progress of ongoing programs.

The Task Force would consist of the Principal and Associate Principal Scientists and Engineers as well as additional members of the technical staff as required to ensure that the best internal expertise is applied to each area evaluated. Personnel from the programs involved would be included in all phases of the evaluation and recommendation process.

In reviewing a science or technology area, the Task Force would take full advantage of available literature and of internal expertise. Whenever possible members of the R&D staff would be asked to prepare and present summaries and recommendations. However the Task Force would be encouraged to use external consultants when necessary to make quality recommendations in a timely manner.

The preliminary recommendations of the Task Force would be discussed with the appropriate Managers and Program Coordinators before presentation to the Directors, Research Fellow and Vice Presidents. Final recommendations would be made at R&D Planning Meetings.

Action Plan: Program Review Process

The ability to explore new areas and concepts is a vital component of the R&D process which should not be unduly hampered. Thus the professional staff should be encouraged to pursue limited exploratory activities with a minimum of administrative detail. However, careful review of activities should occur on a regular basis. Thus it is recommended that formal review procedures be established for the initiation of new programs and for the continuation of existing programs.

For a new program or activity, the procedure would be initiated by the preparation of a proposal containing the following elements:

1. Review of the areas of science and/or technology involved.
2. Definition of objectives in terms of potential (a) business (product or process) contributions and/or (b) fundamental or applied knowledge of value to other programs.
3. Discussion of the technical approaches (tactics) to be employed to reach the above objectives. Major technical roadblocks should be identified and the probability of overcoming them assessed.

4. A review of existing internal and external expertise which might be applied to the program.
5. A projection of the resources required and the anticipated times to reach specified objectives.

Upon consideration and acceptance of the proposal, R&D management would obligate resources to it for a specified time period at the end of which the proposal and review process would be repeated. The proposal would be updated to include progress at PM and elsewhere and the acceptance criteria would include assessment of current resource and business needs. A specified time for the next review would be set and would be dependent on the nature of the program and the resources allocated for it.

It is recommended that R&D management and senior staff participate in the proposal/review process.

SUPPORTING SCIENCE EDUCATION

R&D's involvement in the areas of education and contributions should be part of the overall strategy for this plan period. The corporate philosophy and strategy for contributions will be addressed first. In a memorandum from Mr. Hamish Maxwell to Mr. Jack Nelson, dated February 2, 1990, a new initiative was developed to address issues surrounding the corporate contributions program. The highlights of this new initiative can be summarized into one of Focused Giving. Focused Giving was established to encompass three themes:

1. Education with special focus on the preparedness of the future work force;
2. Hunger and nutrition; and
3. Culture.

A portion of the total budget will be set aside for Focused Giving grants. It is readily apparent that all of R&D's contributions should be centered on the first theme; i.e., education with special focus on preparedness of the future work force. In global terms, the future work force could be members of our current staff, students at the college and post graduate level who are likely candidates to join us in the near future, and students below college level that will serve as the feeder group for higher education.

This department has had sustained contributions for the Virginia Academy and Junior Academy of Science and Project SEED of the American Chemical Society. Both of these programs have benefitted the high school students. Most recently we have embarked upon

graduate fellowships in chemistry at UVa and a graduate fellowship in physics at VPI. The purpose of these two fellowships was to establish a firmer relationship between R&D scientists and these two institutions of higher learning within the Commonwealth. Most other R&D contributions are focused toward a desired goal. In the cases previously cited, donations of money made through Corporate Contributions is to sustain activities in science and mathematics.

In addition to money, we contribute limited internal resources to such activities as conducting laboratory tours or presentations in the lecture hall. It is difficult to measure the worth of such tours. Mentor-student relationships with summer students may be a more effective means for increasing the future pool of employees for R&D. On previous occasions members of the department have conducted advanced chemistry classes for teachers in the Richmond Public schools. There are probably other efforts which have been directed toward contributions or in-kind services in the past, but we have never really established a concerted program for such activities. R&D shared devoting a certain portion of scientists' time in using their talents to assist in instruction of teachers and/or students at the high school, middle school and elementary school level in the Richmond community. Part of the focus of R&D ought to be in the "adopt a school programs". We have been responsible in honoring requests for R&D employees to visit schools to talk about scientific careers, but we need to be more overt in making our presence know in the science and math class rooms in the Richmond area. It would be beneficial to provide Summer Fellowships to outstanding local teachers to work in the R&D laboratories to update knowledge as well as augment their salaries. It should be clearly understood that these positions would not lead to full-time R&D employment. Hiring teachers in the local community to work full time in the laboratory would be detrimental to science education.

It is difficult to separate education support from contributions. In one case we are contributing time and talent toward enhancement of education whereas in other case we are using education as the vehicle to enhance contributions at the corporate level. We must continue to broaden the scientific education of our current staff through the judicious use of tuition refund, sabbaticals, and management directed scientific pursuits. In the latter context, an example involves the work of Gordon Bokelman on Cell Wall Research following R&D's management's decision to send him to Colorado State for such training. Part of our strategy for education for the current work force would be that every member of the department, regardless of status, be encouraged to attend at least one course of learning each year they are employed. This would require more rigorous involvement between R&D administration and the local and state school boards to facilitate such strength. Some of which could even be conducted on site. For example, through the advances in telecommunication, several advanced science and mathematics instruction can be conducted in our conference rooms and/or lecture hall. We have worked with Dr. Thomas Haas at VCU on master's degree programs in engineering.

The essential thrust of this program ought to result in a more overt effort to alleviate some of the existing problems which are currently plaguing science and math education in this

country. Although individual staff members are contributing to their local communities, this department needs to become more visible in local and state scientific activities. Any effort expended by members of the staff in enhancement of science education will certainly result in longer delays in completion of the focused goals of the department. However, this time devoted to establishing the bridge between our department and local and state authorities is and/or should be part of R&D's charter. Without a commitment on the part of senior management, the individual staff members are probably not going to be as effective as they could or should in this worthwhile pursuit. Most major corporations in this country, at this point in time, have developed rigorous programs in their satellite operations in various cities in this country. It is almost impossible to pick up a scientific magazine currently without some mention of what the corporation is doing or has done to ameliorate the problems dealing with increased interest in math and science in their local communities. There are numerous programs available at the national level in almost every scientific society that we could or should be using to sustain our commitment to science and education.

We have a Continuing Fellowship Committee for sabbaticals, a Technology Assessment Group, and a Technical Seminar Committee in the department. It seems appropriate within the confines of the Strategic Plan that we establish a committee on contributions and education for the department whose responsibility would be to establish a coherent program of what Philip Morris USA R&D ought to be doing to enhance the quality of education. There are numerous role model companies such as Dow, Amoco, and General Electric that would be worth on site discussions with our appointed committee. We must recognize that to do this job properly it is going to be a sustained effort which reaches far beyond the Five-Year Strategic Plan period of time. Although some of our current efforts are worthy of our sustained interest and commitment, it would be ill advised to spend a large amount of time and energy in a one to two-year commitment at the local level to satisfy this need. We must make the commitment to use our internal resources of personnel time and budgeted monies to address this concern.

RECURITING

Hiring in R&D (at the professional level) is almost exclusively reactive; that is, we lose a person and then we generate specifications to replace them. We then utilize the Employment Department to generate ads, utilize agencies and to follow up on leads given to them by the hiring management. There is no "hiring plan" to bring in a number of entry level persons on a regular basis. For the past 2-3 years, we have utilized Summer Intern positions as a means for keeping campus contacts for entry level persons. We have designated that all of these positions be filled with minority candidates. We have tried to utilize departments in schools that we feel produce students that we would want to hire. The students we have gotten under this philosophy have been good and we have had some of the students return as they have gone on to pursue advanced degrees (no hires thus far). The overall objective has been to establish a relationship on campus so that when we needed entry level persons we would not be a "new face" on campus,

2026230681

but an established one. Then we could look to hire an intern or hope that the faculty could lead us to viable candidates. This would also mean that they might send candidates our way "out of the scheduled" time frame and we would want to respond positively to that also.

The same basic principles could be utilized for higher level personnel by:

- carefully targeting acceptable programs
- maintaining on-going contacts and providing work opportunities
- hiring a portion of the personnel
- stating up front a commitment to minorities/females
- involving R&D personnel in the management of this process

TRAINING

Cross-Functional Training: The internal situational analysis identified the need for increasing R&D employee's knowledge of tobacco processing and cigarette manufacturing operations. An existing program provides selected bench scientists with this knowledge through 4-6 month assignments in the Semiworks and Process Development Pilot Plants. Even though this program has been successful, it involves only two people per year and has a limited overall impact on R&D. A need exists for a short program aimed at providing general processing/manufacturing knowledge to a majority of the R&D professional staff. It is envisioned that this program would be an annual orientation involving a number of selected individuals. The orientation would include tours of all the different processing and manufacturing plants.

Data Analysis/Project Planning: A project conducted during the period May 15-August 15, 1990, by a Visiting Scientist (Dr. W. Wegscheider) involved a critical evaluation of the potential of alternate methods of data analysis to provide correlations between analytical chemical information and other data such as subjective evaluations. The basic approach utilized multivariate analysis concepts. Traditional methodologies such as statistical analysis and partial least squares (PLS) were employed. In addition, newer concepts such as fuzzy logic, neural networks and artificial intelligence were considered. Several past and/or on-going projects were reviewed as candidates for these approaches. Two factors important to the success of projects were found to be related to the following components important to project execution: project planning and expertise and promptness of data analysis. Recommendations include the enhancement of data analysis expertise and knowledge of data quality issues as well as the enhancement of project management skills involving planning and coordination. Standard operating procedures which outline accepted data analysis methods should be developed where needed and readily available project management training and supporting materials should be targeted to key R&D staff.

2026230682

FACILITY PLAN

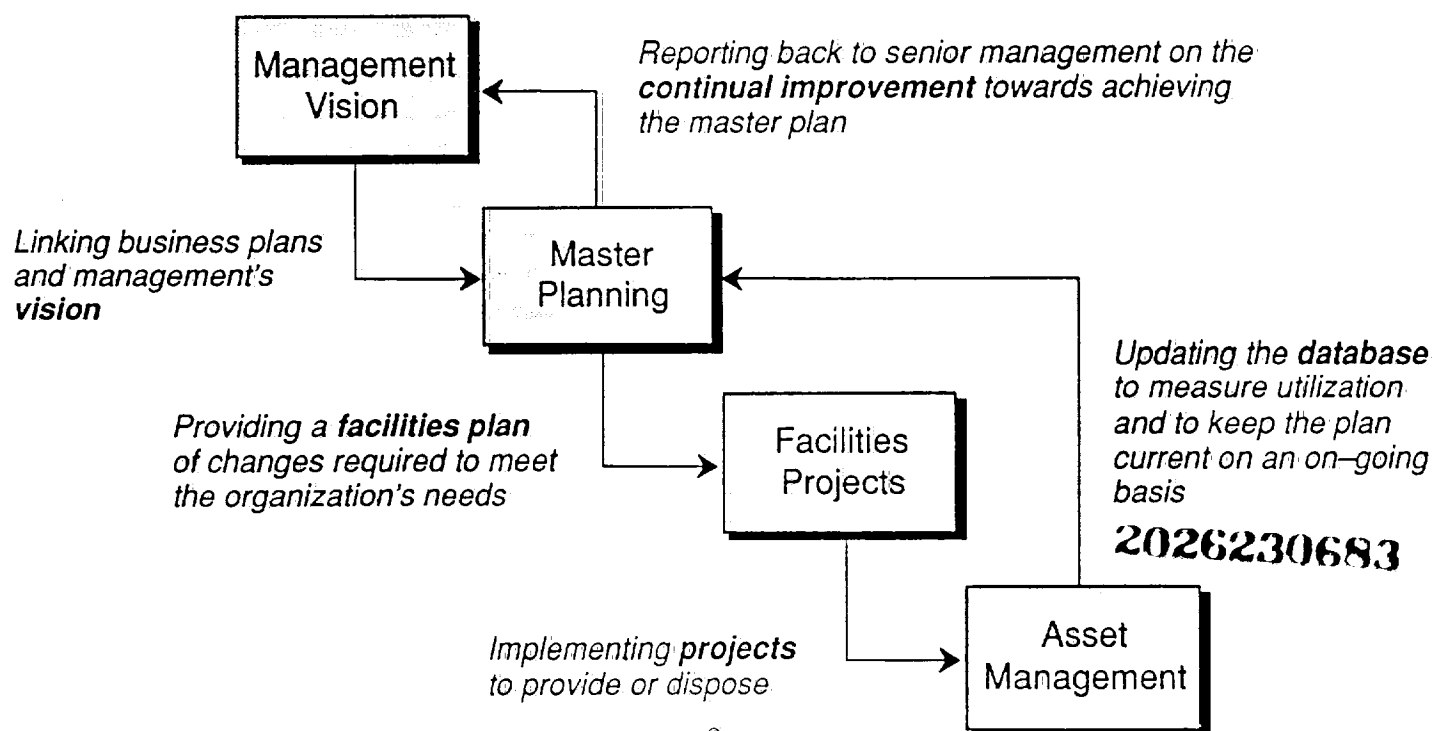
I. INTRODUCTION

Facility master planning is an ongoing process which requires management support, has realistic and feasible projects to implement and one that has a system in place with which to update and measure continual improvement towards achieving the department's and company's mission. A facility master plan is a tool for visualizing the future. It represents a future condition that is better than now exists. If the master plan is to be successful, it must be integrated and linked to the business plan of R&D, as well as the rest of the company. Table I illustrates the process of developing and maintaining a facility master plan.

TABLE I

INTEGRATED MASTER PLANNING PROCESS¹¹

Integrated Master Planning Process



II. FACTORS IMPACTING RESEARCH FACILITIES

According to Jim Richert, Director of R&D facility design at Hellmuth, Obata & Kassabaum, a St. Louis based international facilities consulting firm, "Researchers' facility needs already differ significantly from those twenty, ten or even a few years ago. Several trends signal that the relationships between researchers and their working environments are on the verge of extraordinary change."² In R&D we are experiencing the changes on a daily basis. The increasing cost, complexity and capability of technical instrumentation and the appropriate space and special environmental conditions required to house and maintain them is a constant challenge. Growing concerns about health threats to research personnel and environmental hazards have intensified in recent years as evidenced by the increased number of OSHA standards and guidelines including the most recently published "Chemical Hygiene Plan."³ Over the past five years, research space has been modified in an attempt to provide separate lab areas and work station/desk areas for research personnel. EPA regulations with regard to hazardous chemical disposal, asbestos abatement, waste management and other environmental concerns have continued to escalate in recent years.

Collaborative research programs involving multidisciplinary teams spanning the entire R&D organization have changed the approach for allocation of facility space. The requirement for space to implement new programs on an expedited basis has presented challenges, particularly in the last several years. Available space for special laboratories or pilot plant applications is at a premium. The last remaining area of "undeveloped real estate," the old D1 Semiworks/Primary has been totally cleared to accommodate Project Pack, the modified Smoking Materials Project and a "temporary" laboratory installation for small scale handsheet cast-leaf research. The remainder of space has tentatively been allocated for critical parts inventory and supplies storage for "C" Pilot Plant and the new Cast Sheet Pilot Plant. Laboratory and office space requirements for the personnel currently located on the soon-to-be-demolished C2 Balcony necessitate a major "squeeze play" in order to accommodate the needs. Consolidation of the Paper Program in the O/C, R&D laboratories and Beta project on D2 with concurrent moves of approximately fifty personnel has presented yet another new set of challenges. Several other groups including Analytical Research have specific space requirements which cannot currently be met due to space availability constraints. Space requirements to accommodate new production equipment at the Semiworks will provide challenges in the near future.

All of the factors noted above have signaled the need for a comprehensive review of the current and future requirements of the department with respect to its facilities and whether we will be able to accommodate the new program needs three to five years in the future.

III. THE FACILITY PLAN

It is readily apparent that a proactive plan for the R&D facilities, and one that is closely linked and integrated with the R&D Strategic Plan, must be addressed and developed to move the Department into the future.

The Industrial Engineering Group was requested to assist R&D in developing a Master Facility Plan that would address current, short-term needs and forecast needs five to eight years into the future.

The project, as defined by the industrial engineers assigned to assist R&D, comprises four distinct phases as follows:

Phase I: Space and Program Requirements Analysis

A survey was conducted to collect basic quantifiable space and program needs information. The survey entails a review by major R&D functional area, of current versus forecasted employees, equipment, special laboratory or space needs and service requirements. Information gathered in this phase will serve as the data base from which space-related deficiencies may be addressed, or conversely, space availability opportunities exist to be exploited.

Status: All divisional surveys have been completed. Interviews with R&D managers were conducted in October. Analysis of manager input from the survey results is underway.

Phase II: Develop Conceptual Long-Range Master Facility Plan

Based on results of the space needs analysis, the Industrial Engineers will collaborate with R&D staff to develop a set of feasible overall space utilization alternatives for each of the major R&D buildings, which will achieve the identified long-range research program needs of the Department. Although the major focus of the study is the R&D North Complex, (i.e., the facilities north of Bells Road), assessment is also required of space occupied by R&D staff at the Operations Center and Semiworks to ensure optimal space utilization for the total R&D mission.

2026230685

III. THE FACILITY PLAN (Continued)

Phase III: Develop Solutions for Short-Term Space Needs

Using the Master Facility Plan as a road map, the Industrial Engineers will then address specific requests by R&D staff to develop solutions for identified short-term space issues. These include the following:

A. "D" Pilot Plant

Develop a plan for improved design and space utilization of "D" Pilot Plant.

B. North Complex

Address current cubicle versus office availability and laboratory space utilization with special emphasis on needs for the Analytical Research Division.

C. "E" Building

Address logistical problems associated with the Product Evaluation Division's POL mailout operation, including the feasibility of off-site relocation. (This study is well underway by the Industrial Engineering Department.)

D. R&D Semiworks

A study is currently underway to examine the feasibility of relocating the Competitive Testing mailout operation to another off-site location in order to free up space for other critical needs of the semiworks operation.

Phase IV: Project Engineering Assistance/Implementation

Recommendations identified in the study may require the involvement of Project Engineering to spearhead cost estimating, funding and implementation management. Projects which have been tentatively identified for further analysis include areas in D1 North, "D" Pilot Plant and North Complex laboratory/office areas. It is too early to speculate as to what may be specifically required in the way of renovation and construction to meet the near-term (three to five years) and longer-term (five to eight years) needs of the Department.

2026230686

Once established, the Master Facility Plan will provide a valuable tool for a more proactive approach for management of the R&D facilities in the future.

References:

1. Parshall, Steven A. et. al, "Beyond the Year 2000...Facility Master Plans Envision the Future," *International Facility Management Association Journal*, October 1989, pp. 8-23.
2. *Federal Register*, Vol 55, No. 21, January 31, 1990, pp. 3300-3335; 29 CFR Part 1910 Subpart Z.
3. Richert, Jim, "Designing for the Future of R&D - Redefining the Laboratory Work Environment," presented at the International Facility Management Association R&D Council Spring Meeting, Pittsburgh, PA, June 1990.

2026230687

2026230688

APPENDIX Q

Objective and Strategies of Major Programs

2026230689

ART PROGRAM

Objective

Develop a family of subjectively acceptable low and ultra-low tar, regular and menthol products from filler which has had approximately 97% of its nicotine extracted with supercritical CO₂.

Strategies

1. Determine optimum blend and process conditions to meet the extraction goal under commercially feasible conditions with the best subjective character.
2. Development of casing, aftercut and menthol systems which compliment the subjective attributes of de-nicotinized filler.
3. Determine the optimum nicotine delivery at a given tar level which offers the most acceptable subjective presentation.
4. Develop second-generation process using liquid column absorber technology to replace stems as the absorber material.
5. Support of Low Tar/High Flavor program.
6. To evaluate and develop process modifications for the utilization of ART process by-product tobaccos.

2026230690

PROJECT BETA
(SEE APPENDIX A)

2026230691

Domestic Product Development

Objective:

To develop new cigarette products for PM USA which will contribute to volume growth in the USA market.

Strategies:

1. To provide support for the development of cigarette products which utilize new or emerging technologies to offer product advantages to the consumer.
 - Bold
 - Ambrosia
 - Low Sidestream
2. To develop cigarette products for new product introductions which satisfy our business objectives of income, volume and market share.
3. Maintain and/or enhance the subjective, analytical and physical performance of existing products in the marketplace, in a manner which addresses issues relating to capacity, quality and productivity.

2026230692

FILTRATION RESEARCH

Objective

Provide filtration research support for the development of new and/or improved products.

Strategies

1. Develop new or unique filtration system.
2. Support new product development.
3. Support the existing business through:
 - a. Product uniformity improvements
 - b. Cost reductions
 - c. Alternative materials.

2026230693

International Product Support

Objective:

To develop new cigarette products for PM International markets which will contribute to volume growth worldwide.

Strategies:

1. To develop new cigarette products that meet PMI management's planned product introductions, to include key markets for USA export products and those markets supported by locally manufactured products.
2. Develop new cigarette products in anticipation of international consumer trends and/or providing a marketing advantage.
 - Alternative filter configurations (concentrics, fluted, SCS)
 - Low Sidestream
 - Art
 - Half Nic
 - Menthol
 - Ultra Low Tar
 - Ambrosia
 - Superslims
 - Price/Value
3. Maintain and/or enhance the subjective, analytical and physical performance of existing products in the marketplace.
4. Continue to improve understanding of international markets through the following:
 - Interpretation of market sales data and demographics.
 - Initiation of switching and tracking studies.
 - Improve understanding of individual markets in order to develop optimal blends, flavors, filter systems and delivery levels.

2026230694

- Initiation of research programs to identify the perceived product benefits most viable in international markets.
- Interface with PMI operations, marketing and sales personnel.

2026230695

OPERATIONS SUPPORT

Objective

The operations support program provides resources from across the entire department to support a wide range of technology needs for the current business of PM USA. In each program, the goal is to provide timely resources and also to monitor technology transfer. When appropriate, training activities are provided so that ongoing needs can be taken over by appropriate departments.

Strategies

Adhesives

1. Obtained signed agreements with all vendors.
2. Assign personnel and equipment to develop standards in cooperation with Purchasing.
3. Issue standards and work with vendors to insure compliance.

Cigarette Monitoring

1. Monitor all new brand production.

Materials Evaluation

1. Obtain management support for redefined program and allocate resources.
2. Prioritize indirect materials.
3. Initiate improved database.
4. Remove inappropriate materials from PM inventory.

Customer Complaints

1. Rapidly investigate and report on samples submitted.

2026230696

Flavor Development/Analytical Studies

1. Set priorities for maximum product benefit.
2. Allocate appropriate resources.

Marlboro Standardization

1. Continue to monitor all aspects of quality and uniformity of Marlboro.
2. Analyze database, interpret trends and make recommendations.

Alternate Humectants/Preservatives

1. Identify materials which meet performance criteria in the laboratory.
2. Demonstrate acceptable performance in a manufacturing setting.

Microbiological Quality Improvement

1. Identify critical issues for microbiological improvement.
2. Systematically investigate agreed on issues.
3. Follow up on recommendations with appropriate operations staff to insure new technologies are functional in a manufacturing environment.

Monogram Inks

1. Complete and document priority study.

Packaging Inks and Solvents

1. Provide information needed to comply to all regulations regarding packaging.
2. Assist in developing new packaging technologies with respect to printing.
3. Insure requested support has a high priority.

2026230697

Semiworks Support

1. Provide staff and equipment for timely completion of ongoing support for priority projects.

Burley Spray/Dry Flavors

1. Complete and document ongoing study.
2. Implement improved dry flavor system.

Flavor Specifications/Certification

1. Complete export certification.
2. Document and transfer certification to Flavor Center by 11/1/90.
3. Complete flavor specifications.
4. Document and transfer to Q.A.
5. Provide ongoing specifications capability.

ETS Studies

1. Discontinue active research.
2. Monitor literature and provide support for PACT.

Entomological Support

1. Implement Kabat® IGR application as centerpiece of integrated pest control.
2. Develop new technology for integrated pest control.

Project Warhol

1. Complete report and make recommendations.

2026230698

Engineering Studies/Methods

1. Participate in study design and identify critical analytical issues to be resolved.
2. Develop methods and obtain data.
3. Assist in statistical evaluation of results.

Recon. Sheet Certification

1. Document analytical methods for certification.
2. Train Q.A. staff and transfer technology.

Cooperative Leaf Studies

1. Provide continuing support to key studies sponsored by Leaf Department.

Environmental Issues

1. Maintain contacts with E.E.P. and monitor environmental literature.
2. Obtain equipment and methods needed for priority issues identified by R&D and E.E.P.
3. Develop new technology to address environmental issues in proactive manner.

2026230699

PAPER TECHNOLOGY/REDUCED SIDESTREAM

Objectives

1. To design cigarette papers which will significantly reduce sidestream visibility, odor and irritation without adversely impacting subjectives by 1995 (Reduced Sidestream).
2. To assist in the development and application of flavor-release compounds on cigarette paper in order to develop products with modified sidestream smoke aroma (Project Ambrosia).
3. Develop web materials which have the subjective properties of CA and the filtration properties of paper (Web Filters).
4. To develop procedures for the application of transverse bands to cigarette paper in order to control burn rate (Project Tomorrow).
5. To design a cigarette paper which will control ash flaking on ultra low delivery cigarettes (Marlboro Ultra Lights, Bold) (Papers to Control Ash Flaking).
6. Modify cork-on-white tipping to eliminate filter flare-up through the use of defined levels of low silicate inks (Tipping Papers).
7. Modify white tipping papers to improve lip release properties (Tipping Papers).

Strategies

1. Optimize 45 g/m² calcium carbonate Superslims outer wrap through selection of type and level of fluxing agent(s) to give 70+% sidestream reduction and improved subjectives.
2. Develop single wrap for Superslims which will maintain parity with current double wrapped model with respect to sidestream reduction and subjectives.
3. Optimize 45 g/m² calcium carbonate paper for a full circumference product through the selection of type and level of fluxing agent(s) to give at least 70% sidestream reduction without any sacrifice in subjectives.

2026230700

4. To develop low sidestream papers based on crystalline forms of magnesium carbonate or mixed magnesium carbonates including magnesite, hydromagnesite, and iitelite.
5. To develop low sidestream papers based on amorphous forms of magnesium carbonate (sol-gel process) using material which can be scaled-up to produce commercial quantities.
6. To carry out studies designed to elucidate the mechanism by which magnesium carbonates and mixed magnesium carbonates achieve sidestream visibility reduction.
7. To utilize analysis of mainstream smoke, with emphasis on gas phase, to determine smoke chemistry differences between normal and reduced sidestream models in order to design filters which will result in improved subjectives.
8. To develop unique, cigarette compatible catalyst systems which will result in more complete conversion of sidestream gas phase into carbon oxides in order to reduce odor and irritation.
9. Develop optimum methods for application of flavor-release compounds on to cigarette paper.
10. Assist with the commercial development of promising flavor-release compounds.
11. Develop the requisite chemistry to covalently bind flavor molecules to either cellulose or starch in order to be able to make paper with inherent flavor-release properties.
12. Optimize paper made from a furnish consisting of a mixture of cellulose and cellulose acetate.
13. Develop techniques for the partial acetylation of cellulose pulp which can be used to make paper appropriate for filter making.
14. Assist the Filter Development Program with the development of novel papers for filters which would be proprietary to PM.
15. Design and construct a prototype paper making machine with a dandy roll which will allow the application of a cellulosic slurry to paper while on the Fourdrinier wire.

2026230701

16. Explore the application of bands of burn retardant chemicals to cigarette paper using either rotogravure or ink jet printing techniques.
17. Determine the feasibility of forming dense bands on paper through a wet calendering process.
18. Assist with the modification of a Max-S tipper which would be able to affix bands of dense paper at regular intervals to cigarette paper.
19. Obtain machine made paper with increased basis weight, and an increased amount of high surface area calcium carbonate. Optimize level of burn additive to obtain satisfactory ash and desired puff count.
20. Work with Technical Services and Purchasing to qualify the modified tipping paper, and develop appropriate QA tests with Analytical Research Division and Incoming Materials QA.
21. Evaluate tipping papers with increased levels of nitrocellulose.
22. Investigate the use of film formers (PVA, CMC, etc.) to "hold out" the nitrocellulose from the tipping paper.

2026230702

PROJECT TOMORROW

Objective

To evaluate the feasibility of developing an ignition-propensity test for cigarettes and to evaluate the technical and commercial feasibility of making cigarettes with reduced ignition propensities with respect to such a test.

Strategies

1. Evaluate the feasibility of developing a test for cigarette ignition propensities and determine if cigarette design parameters influence their ignition propensities in such a test.
2. Develop a computer model of cigarette/substrate ignition.
3. Design selected types of cigarettes at reduced mass burn rates, while maintaining consumer-acceptable delivery, physical, and subjective properties to the greatest extent possible.
4. Explore new technologies which may lead to more fire-safe cigarettes.

2026230703

OPTICAL PROCESSING

Objective

Develop automated vision systems specifically tailored to the applications of PM USA for the improvement of product quality and manufacturing efficiency.

Strategies

1. Develop and implement product inspection systems to aid in the achievement of Manufacturing's targeted reductions in defect rates by both rejecting defective product and by providing the output needed for the optimization of the manufacturing process.
2. Develop and implement material inspection systems to provide a more reliable and efficient means of guaranteeing the conformity of materials to PM specifications. Provide the inspection capability needed to permit a shift in the responsibility for inspection toward the materials vendor.
3. Develop and apply new inspection algorithms and hardware to
 - a. maintain a competitive advantage within the tobacco industry
 - b. provide alternative hardware suppliers for installed systems
 - c. permit the extension of the use of automated vision to increasingly varied and complex inspection problems.

2026230704

LOW TAR/HIGH FLAVOR

Objective

To develop ultra-low tar and/or reduced nicotine cigarettes equal subjectively to cigarettes with at least twice the tar and/or nicotine utilizing conventional technology and, as appropriate, technological advances from other programs, particularly those proprietary PM technologies such as ART which may provide a competitive marketing edge for the Company.

Strategies

1. Develop 2 and 6 mg cigarettes with enhanced total subjective character.
2. "Ultima" -- Develop ultralow tar (1-3 mg) products which will provide a competitive edge in the existing U.L. market segment.
3. "Best of the Lowest" -- Develop products which utilize proprietary PM technologies, viz., tar reduction, nicotine control, flavor delivery, etc., which will demonstrate consumer advantages via R.G.A. testing.
4. Filter Research and Development.
5. Paper Technology.
6. Flavor Research & Development.

2026230705

CAST LEAF

Objectives

1. Develop reconstituted cast leaf products that will provide flexibility in meeting capacity needs for individual sheet types.
2. Optimize current RCB process for physical properties, capacity and environmental goals.
3. Support R&D programs requiring non-standard cast sheet.
4. Support International needs for reconstituted product development/evaluation.

Strategies

1. Evaluate material, environmental, and capacity requirements.
2. Evaluate RCB process effluent and develop process modifications as needed.
3. Conduct work in Cast Leaf Pilot Plant leading to new non-ammoniacal recon product.
4. Evaluate new denitration technology in lab.
5. Cast Leaf Design Package which addresses

Capacity
Special needs
International needs

2026230706

NEW EXPANDED TOBACCO

Objectives

1. Develop an expanded tobacco material having more "tobacco-like" subjectives.
2. Reduce degradation to allow for improved product quality and better yield.
3. Reduce CO₂ emissions as compared to DIET.

Strategies

DIET Improvement

1. Assure plug flow, short residence time at tower infeed.
2. Provide uniform gas-tobacco distribution in the tower.
3. Eliminate separator recycle.
4. Provide plug flow discharge from separator with proper residence time for thermal treatment.
5. Determine if fundamental degradation principles identified in the initial clump-free DIET development apply in the Australian DIET plant.
6. Reduce degradation from impregnator discharge to vibrating grid.
7. Evaluate potential of gas impregnation and, if applicable, determine modifications to current DIET process design to allow for future use.
8. Evaluate existing DIET pilot plant instrumentation and modify as required to provide for adequate and efficient data evaluation.
9. Support design of gaseous batch impregnation process.

Continuous Impregnation Process

1. Develop a tobacco precooling process for batch and continuous gaseous impregnation.

2026230707

2. Determine conditions of tobacco impregnation with gaseous CO_2 over a pressure range of 200 to 900 psi.
3. Develop, design and fabricate process equipment for a continuous impregnation pilot process.
4. Install and test a pilot system for a continuous gaseous impregnation process.
5. Develop, design, and fabricate a continuous impregnation process utilizing a linear-pocket feeder system.
6. Investigate and evaluate the possibility of inert gas impregnation.
7. Determine the effect of filler casing on gaseous impregnation.
8. Evaluate the degree of subjective improvement associated with gaseous impregnation.
9. Determine the physical and/or chemical forms the impregnant takes within the tobacco.
10. Quantify the sorption properties of the substrate at equilibrium.
11. Quantify the sorption properties of the tobacco substrate under dynamic conditions.

Alternate Puff/Dry/Set Techniques

1. Determine conditions for optimum puffing.
2. Determine mechanisms which are responsible for collapse in or exiting the expansion tower.
3. Determine the process/product parameters which control product setting.
4. Define the role and mechanism of stiffening in determining product quality.
5. Define expanded product quality measures which translate directly into cigarette quality measures.

2026230708

6. Determine if cooling tobacco after expansion/setting improves subjectives with no negative impact on product physical characteristics.
7. Implement the defined processing steps/parameters in pilot expansion process.
8. Optimize and evaluate the processing schemes.

High Capacity Processes for Partial Expansion of Tobacco

1. Review and summarize previous work.
2. Identify potential processing schemes and test concepts with existing equipment, lab evaluations, and/or vendor tests.
3. Construct a pilot development facility.
4. Determine the relationship between processing conditions and subjective/physical properties for each tobacco type (bright, burley, oriental).
5. Compare the effect of blend expansion in various combinations with the expansion of individual blend components on subjective/physical properties.
6. Determine the contribution of DIET and ES components to subjective/physical properties both as standard expanded products and as included in partial expansion.
7. Analyze blend similarities and production requirements for all brands.
8. Propose one or more processing schemes for detailed physical, chemical, subjective, and economic evaluation.

2026230709

LOWERED BIOLOGICAL ACTIVITY

Objective

To decrease the activity of cigarette smoke condensate (CSC) by 90%, relative to 2R1 CSC, as determined by multiple *in vitro* assays.

Strategies

1. **Bioassay Development:** Establish *in vitro* bioassays which can differentiate among CSCs from various model cigarettes.
2. **Model Development:** Prepare model cigarettes designed to reduce biological activity.
3. **Model Evaluation:** Test CSC from new model cigarettes.
4. **Model Optimization:** Improve the subjectives of a low activity model.
5. **Information Survey:** Gather information from the outside scientific community relevant to biological activity.

2026230710

TSNA

Objectives

1. To design a first generation laboratory model of a product by 1991 with MS TSNA (TSNA/mg TPM) delivery reduced 90% relative to the TPM-corrected TSNA delivery of a 1987 full-flavored, blended cigarette.
2. To design a second generation laboratory model of a product by 1993 with MS TSNA delivery (TSNA/mg TPM) delivery reduced 95% relative to the TPM-corrected TSNA delivery of a 1987 full-flavored, blended cigarette, utilizing technology based on a fundamental understanding of NA formation.

Strategies

Reduction of MS TSNA By Reducing Preformed TSNA & Pyrosynthetic TSNA Precursors in Filler

1. Reduce MS TSNA by selective removal of TSNA, amine precursors, and/or nitrosating agent precursors from filler.
2. Reduce MS TSNA by biochemical alteration(s) to tobacco leading to removal of alkaloid precursors of TSNA.

Reduction of MS TSNA By Inhibiting the Pyrosynthesis of TSNA

3. Reduce the levels of pyrosynthesized MS TSNA by incorporation into the cigarette design those aspects of oriental filler which result in an absence of significant TSNA pyrosynthesis from oriental tobacco.
4. Reduce the levels of pyrosynthesized MS TSNA by decreasing the reactivity to nitrosation of the amine precursors, or blocking reaction pathways which form nitrosating agents or which yield TSNA from the nitrosating agents.

Reduction of MS TSNA By Enhancing Decomposition of TSNA

5. Evaluate the enhancement of TSNA decomposition during smoking as a method for reducing TSNA delivery.

2026230711

Reduction of MS TSNA By Altering Physical/Chemical Parameters of Cigarettes

6. Reduce the levels of pyrosynthesized MS TSNA by alterations in cigarette construction parameters.
7. Reduce the levels of pyrosynthesized MS TSNA by manipulation of filler salt content.
8. Reduce the levels of pyrosynthesized MS TSNA by manipulation of casings typically used in cigarettes but missing from the reference cigarette.

2026230712

2026230713